

sequence listing.txt SEQUENCE LISTING

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47	

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Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg 50 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile 65 70 75 80

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr Ile 85 90 95

Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn Ile 165 170 175

Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val Thr 195 200 205

Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala Glu 210 215 220

Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro Lys 235 230 240

Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg Ile 245 250 255

His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr 260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu 275 280 285

Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn 290 295 300

Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr 305 310 315 320

Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu 325 330 335

Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala 355 360 365 Page 19

Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser 370 375 380 Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn 385 390 400 Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr 405 410 415 His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr 420 425 430 Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly 435 445 Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile 450 455 460 Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu 465 470 475 480 Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly 485 490 495 Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 505 510Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu 515 525 Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly 530 535 540 Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys 545 550 560 Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu 565 570 575 Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys 580 585 590 Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly 595 600 Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Page 20

Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu Ala 625 630 635 640 630

Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile 645 650 655

Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His 660 665 670

Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu Ala 675 680 685

Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val 690 695 700

Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu 705 710 715 720

Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn 725 730 735

Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg 740 745 750

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Asn Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Gln Ile 35 40

Asp Glu Val Arg Lys Ile Thr Ala Glu Arg His Gly Lys Ile Val Arg Page 21

Ile Ile Asp Ala Glu Lys Val Arg Lys Lys Phe Leu Gly Arg Pro Ile 65 70 75 80 Glu Val Trp Arg Leu Tyr Phe Glu His Pro Gln Asp Val Pro Ala Ile 85 90 95 Arg Asp Lys Ile Arg Glu His Ser Ala Val Ile Asp Ile Phe Glu Tyr 100 105 110 Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125 Met Glu Gly Asp Glu Glu Leu Lys Leu Leu Ala Phe Asp Ile Glu Thr 130 135 140 Leu Tyr His Glu Gly Glu Glu Phe Ala Lys Gly Pro Ile Ile Met Ile 145 150 155 160 Ser Tyr Ala Asp Glu Glu Glu Ala Lys Val Ile Thr Trp Lys Lys Ile 165 170 175 Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys 180 185 190 Arg Phe Leu Lys Val Ile Arg Glu Lys Asp Pro Asp Val Ile Ile Thr 195 200 Tyr Asn Gly Asp Ser Phe Asp Leu Pro Tyr Leu Val Lys Arg Ala Glu 210 220 Lys Leu Gly Ile Lys Leu Pro Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 240 Met Gln Arg Leu Gly Asp Met Thr Ala Val Glu Ile Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr His Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 270 Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu 275 280 285

Lys Val Tyr Ala His Glu Ile Ala Glu Ala Trp Glu Thr Gly Lys Gly 290 295 300

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val	Gly	Gln	Pro 340	Leu	Тгр	Asp	val	Ser 345	Arg	Ser	Ser	Thr	G]y 350	Asn	Leu
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Pro	Asn 370	Lys	Pro	Asp	Glu	Arg 375	Glu	туг	Glu	Arg	Arg 380	Leu	Arg	Glu	Ser
Tyr 385	Αla	Gly	Glу	туг	va1 390	Lys	Glu	Pro	Glu	Lys 395	G1y	Leu	Trp	Glu	G1y 400
Leu	val	Ser	Leu	Asp 405	Phe	Arg	Ser	Leu	Туг 410	Pro	Ser	Ile	Ile	11e 415	Thr
His	Asn	۷al	Ser 420	Pro	Asp	Thr	Leu	Asn 425	Arg	Glu	Gly	Cys	Arg. 430	Glu	Туr
Asp	۷al	Ala 435	Pro	Glu	۷al	Gly	ніs 440	Lys	Phe	Cys	Lys	Asp 445	Phe	Pro	Gly
Phe	 11e 450	Pro	Ser	Leu	Leu	Lys 455	Arg	Leu	Leu	Asp	G1u 460	Arg	Gln	Glu	Ile
Lys 465	Arg	Lys	Met	Lys	Ala 470	ser	Lys	Asp	Pro	11e 475	Glu	Lys	Lys	Met	Leu 480
Asp	Tyr	Arg	Gln	Arg 485		Ile	Lys	Ile	Leu 490	Ala	Asn	ser	Tyr	Tyr 495	Gly
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Ser	val	Thr 515		1 Trp	Gly	' Arg	Glu 520	Tyr	Ile	e Glu	Phe	Va 1 525	Arg	Lys	Glu
Leu	G]u 530		ı Lys	Phe	e Gly	Phe 535	Lys	∨al	Leu	ı Tyr	11e 540	Asp	Thr	Asp	Gly
Leu 545		· Ala	1 Thr	· Ile	Pro 550	61y	/ Ala	Lys	Pro	61u 555	Glu	Ile	. Lys	Lys	560

Ala Leu Glu Phe Val Asp Tyr Ile Asn Ala Lys Leu Pro Gly Leu Leu 565 570 575

Glu Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys 580 585 590

Lys Lys Tyr Ala Leu Ile Asp Glu Glu Gly Lys Ile Ile Thr Arg Gly 595 600

Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln 610 620

Ala Lys Val Leu Glu Ala Ile Leu Lys His Gly Asn Val Glu Glu Ala 625 630 635 640

Val Lys Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Ile 645 650 655

Pro Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Pro Leu His
660 665 670

Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Arg Leu Ala 675 680 685

Ala Arg Gly Val Lys Val Arg Pro Gly Met Val Ile Gly Tyr Ile Val 690 695 700

Leu Arg Gly Asp Gly Pro Ile Ser Lys Arg Ala Ile Leu Ala Glu Glu 705 710 715 720

Phe Asp Leu Arg Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn 725 730 735

Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Ala Phe Gly Tyr Arg 740 745 750

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thermococcus gorgonarius

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100 105 110 Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Glu Thr Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 155 160 Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Ile 165 170 175 Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190 Arg Phe Leu Lys Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Ser Glu 210 215 220 Lys Leu Gly Val Lys Phe Ile Leu Gly Arg Glu Gly Ser Glu Pro Lys 235 240 Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255

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His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Gln Pro Lys Glu Lys Val Tyr Ala Glu Glu Ile Ala Gln Ala Trp Glu Thr Gly Glu Gly Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 320 Glu Leu Gly Lys Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335 Val Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Glu Ser Tyr 370 375 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile 385 390 395 400 385 Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Glu Glu Tyr Asp 420 425 430 Val Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445 Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Val Lys 450 455 460 Lys Lys Met Lys Ala Thr Ile Asp Pro Ile Glu Lys Lys Leu Leu Asp Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Phe Tyr Gly Tyr
485 490 495 490 485 Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser Page 26

Val Thr Ala Trp Gly Arg Gln Tyr Ile Glu Thr Thr Ile Arg Glu Ile 515 520 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Phe 530 535 540 Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Ala 545 550 555 560 Lys Glu Phe Leu Asp Tyr Ile Asn Ala Lys Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys 580 585 590 Lys Tyr Ala Val Ile Asp Glu Glu Asp Lys Ile Thr Thr Arg Gly Leu 595 600 605 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620 Arg Val Leu Glu Ala Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 635 640 Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Asp Leu Lys Asp 660 665 670 Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 680 685 Gly Ile Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700 Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720 Asp Pro Ala Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln
725 730 735 Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750 sequence listing.txt
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Leu Lys Pro Lys Thr 770

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<213> Pyrococcus sp.

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Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Glu His Gly Ala Val Ile Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Val Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Gln Thr

Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Val 165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Arg Glu Met Ile Lys 180 185 190

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Lys 225	Leu	Gly	Ile	Asn	Phe 230	Ala	Leu	Glу	Arg	Asp 235	Gly	Ser	Glu	Pro	Lys 240
Ile	Gln	Arg	Met	Gly 245	Asp	Arg	Phe	Αla	va1 250	Glu	Val	Lys	Gly	Arg 255	Ile
His	Phe	Asp	Leu 260	Tyr	Pro	٧a٦	Ile	Arg 265	Arg	Thr	Ile	Asn	Leu 270	Pro	Thr
Tyr	Thr	Leu 275	Glu	Ala	۷al	туг	G]u 280	Ala	val	Phe	Gly	Gln 285	Pro	Lys	Glu
Lys	Va1 290	Tyr	Αla	Glu	Glu	Ile 295	Thr	Pŗro	Ala	Trp	Glu 300	Thr	Gly	Glu	Asn
Leu 305	Glu	Arg	Val	Ala	Arg 310	Tyr	Ser	Met	Glu	Asp 315	Аlа	Lys	Val	Thr	Tyr 320
Glu	Leu	Gly	Lys	G]u 325	Phe	Leu	Pro	Met	Glu 330	Аlа	G]n	Leu	Ser	Arg 335	Leu
Ile	Gly	Gln	Ser 340	Leu	Тгр	Asp	۷a٦	Ser 345	Arg	Ser	Ser	Thr	G]y 350	Asn	Leu
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Pro	Asn 370		Pro	Asp	Glu	Lys 375	Glu	Leu	Ala	Arg	Arg 380	Arg	Gln	Ser	Tyr
Glu 385	Gly	Gly	Tyr	Val	Lys 390	Glu	Pro	Glu	Arg	G]y 395	Leu	Trp	Glu	Asn	Ile 400
val	Tyr	Leu	Asp	Phe 405	Arg	Ser	Leu	Туг	Pro 410	Ser	Ile	Ile	Ile	Thr 415	His
Asn	Val	Ser	Pro 420		Thr	Leu	ı Asn	Arg 425	Glu	Gly	Cys	Lys	G]u 430	Туr	Asp
۷a٦	Αla	435	"Gln	val	Gly	His	440	Phe	Cys	Lys	Asp	Phe 445	Pro	Gly	Phe

Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Ile Lys 450 460

Lys Lys Met Lys Ala Thr Ile Asp Pro Ile Glu Arg Lys Leu Leu Asp 465 470 475 480

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr 485 490 495

Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser 500 505 510

Val Thr Ala Trp Gly Arg Glu Tyr Ile Thr Met Thr Ile Lys Glu Ile 515 520 525

Glu Glu Lys Tyr Gly Phe Lys Val Ile Tyr Ser Asp Thr Asp Gly Phe 530 540

Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala 545 550 555 560

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Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys 580 585 590

Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu 595 600 605 _

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620

Arg Val Leu Glu Ala Leu Leu Lys Asp Gly Asp Val Glu Lys Ala Val 625 630 635 640

Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro 645 650 655

Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Asp Leu Lys Asp 660 665 670

Tyr Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 680 685

Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700 Page 30

Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720

Asp Pro Thr Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln
725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750

Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Ser Ala Trp 755 760 765

Leu Lys Pro Lys Gly Thr 770

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thermococcus litoralis

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Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Leu Asp Pro 20 25 30

His Phe Gln Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40 45

Glu Glu Ile Lys Ala Ile Lys Gly Glu Arg His Gly Lys Thr Val Arg 50 60

Val Leu Asp Ala Val Lys Val Arg Lys Lys Phe Leu Gly Arg Glu Val 65 70 75 80

Glu Val Trp Lys Leu Ile Phe Glu His Pro Gln Asp Val Pro Ala Met 85 90 95

Arg Gly Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Leu Leu Ala Phe Asp Ile Glu Thr Page 31

Phe Tyr His Glu Gly Asp Glu Phe Gly Lys Gly Glu Ile Ile Met Ile 145 150 155 160 Ser Tyr Ala Asp Glu Glu Glu Ala Arg Val Ile Thr Trp Lys Asn Ile 165 170 175 Asp Leu Pro Tyr Val Asp Val Val Ser Asn Glu Arg Glu Met Ile Lys 180 185 190 Arg Phe Val Gln Val Val Lys Glu Lys Asp Pro Asp Val Ile Ile Thr 195 200 205 Tyr Asn Gly Asp Asn Phe Asp Leu Pro Tyr Leu Ile Lys Arg Ala Glu 210 215 220 Lys Leu Gly Val Arg Leu Val Leu Gly Arg Asp Lys Glu His Pro Glu 225 230 235 240 Pro Lys Ile Gln Arg Met Gly Asp Ser Phe Ala Val Glu Ile Lys Gly 245 250 255 Arg Ile His Phe Asp Leu Phe Pro Val Val Arg Arg Thr Ile Asn Leu Pro Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Leu Gly Lys Thr 275 280 285 Lys Ser Lys Leu Gly Ala Glu Glu Ile Ala Ala Ile Trp Glu Thr Glu 290 295 300 Glu Ser Met Lys Lys Leu Ala Gln Tyr Ser Met Glu Asp Ala Arg Ala 305 310 315 320 Thr Tyr Glu Leu Gly Lys Glu Phe Phe Pro Met Glu Ala Glu Leu Ala 325 330 335 Lys Leu Ile Gly Gln Ser Val Trp Asp Val Ser Arg Ser Ser Thr Gly 340 350 Asn Leu Val Glu Trp Tyr Leu Leu Arg Val Ala Tyr Ala Arg Asn Glu 355 360 365 Leu Ala Pro Asn Lys Pro Asp Glu Glu Glu Tyr Lys Arg Arg Leu Arg 370 375 380

Thr Thr Tyr Leu Gly Gly Tyr Val Lys Glu Pro Glu Lys Gly Leu Trp

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Glu Asn Ile Ile Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile 405 410 415

Val Thr His Asn Val Ser Pro Asp Thr Leu Glu Lys Glu Gly Cys Lys 420 425 430

Asn Tyr Asp Val Ala Pro Ile Val Gly Tyr Arg Phe Cys Lys Asp Phe 435 440 445

Pro Gly Phe Ile Pro Ser Ile Leu Gly Asp Leu Ile Ala Met Arg Gln 450 460

Asp Ile Lys Lys Met Lys Ser Thr Ile Asp Pro Ile Glu Lys Lys 465 470 475 480

Met Leu Asp Tyr Arg Gln Arg Ala Ile Lys Leu Leu Ala Asn Ser Tyr 485 490 495

Tyr Gly Tyr Met Gly Tyr Pro Lys Ala Arg Trp Tyr Ser Lys Glu Cys 500 505

Ala Glu Ser Val Thr Ala Trp Gly Arg His Tyr Ile Glu Met Thr Ile 515 525

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Lys Lys Ala Lys Glu Phe Leu Asn Tyr Ile Asn Ser Lys Leu Pro Gly 565 570

Leu Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Leu Arg Gly Phe Phe Val

Thr Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Arg Ile Thr Thr 595 600 605

Arg Gly Leu Glu Val Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu 610 620

Thr Gln Ala Lys Val Leu Glu Ala Ile Leu Lys Glu Gly Ser Val Glu 625 630 635 640

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Ile Gly Gln Gly Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr 370 375 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile 385 390 395 400 val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp 420 425 430 Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445 Ile Pro Ser Leu Leu Gly Asm Leu Leu Glu Glu Arg Gln Lys Ile Lys Arg Lys Met Lys Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp 465 470 480 Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
485 490 495 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser 500 505 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu 515 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu 530 535 540 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Ala 545 550 560 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys 580 590

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Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu 595 600 605

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620

Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val 625 630 635 640

Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro 645 650 655

Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Glu Leu Lys Asp 660 665 670

Tyr Lys Ala Thr Gly Pro His Val Ala Ile Ala Lys Arg Leu Ala Ala 675 680 685

Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700

Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720

Asp Pro Thr Lys His Lys Tyr Asp Ala Asp Tyr Tyr Ile Glu Asn Gln 725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys
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20 25 30
Page 37

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Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala Glu 210 215 220

Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro Lys 235 230 240

Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg Ile 245 250 255

His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr 260 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu Page 38

280 275 Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn 290 295 300 Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr 305 310 315 320 Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu 325 330 335 Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala 355 360 365 Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser 370 375 380 Tyr Thr Pro Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn 385 390 395 400 Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr 405 410 415His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr 420 425 430

Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly 435 440 445

Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile 450 455 460

Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu 465 470 475 480

Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly 485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 505 510

Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu 515 520 525

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Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys Ile 35 40 45

Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg 50 55 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile 65 70 75 80

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr Ile 85 90 95

Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

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Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn Ile 165 170 175

Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val Thr 195 200 205 ′

Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala Glu 210 215 220

Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro Lys 225 230 235 Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr 260 Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu 275 280 285 Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn 290 295 300 Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr 305 310 315 320 Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu 325 330 335 Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala 355 . 360 . 365 Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser 370 375 380 Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn 385 390 400 Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr 405 410 415 His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr 420 430 Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly 435 440 445

Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu 465 470 475 480 Page 42

Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile 450 455 460

Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly 485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 505 510

Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu 515 520 525

Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly 530 540

Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys Lys 545 550 555 560

Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu 565 570 575

Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys 580 585 590

Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly 595 605

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Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile 645 650 655

Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His 660 665 670

Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu Ala 675 680 685

Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val 690 695 700

Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu 705 710 715 720

Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Page 43 Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg 740 745 750

Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr Ser 755 760 765

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Pyrococcus furiosus <213>

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Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg 50 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile 65 70 75

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Pro Thr Ile Arg 85 90 95

Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr Asp 100 105 110

Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro Met

Glu Gly Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu Thr Leu 130 135 140

Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met Ile Ser 145 150

Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn Ile Asp Page 44

Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys Arg 180 185 190

Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val Thr Tyr 195 200 205

Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala Glu Lys 210 215 220

Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro Lys Met 225 230 235 240

Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg Ile His 245 250 255

Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr Tyr 260 265 270

Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu Lys 275 280 285

Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn Leu 290 295 300

Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr Glu 305 310 315 320

Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu Val 325 330 335

Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu Val 340 350

Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala Pro 355 360 365

Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser Tyr 370 375 380

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Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr His 405 410 415

sequence listing.txt Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser 500 505 510 Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu Leu 515 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly Leu 530 540 Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys Lys Ala 545 550 555 560 Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys 580 585 Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly Leu 595 600 605 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620 Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 640 Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His Glu

Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu Ala Ala 675 680 685

Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val Leu 690 695 700

Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu Tyr 705 710 720

Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln
725 730 735

Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg Lys 740 745 750

Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr Ser Trp 755 760 765

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Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys Ile 35 40 45

Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg 50 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile 65 70 75

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Thr Ile Arg Glu Lys 85 90 95

Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr Asp Ile Pro 100 105 110

Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro Met Glu Gly 115 120

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Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met Ile Ser Tyr Ala 145 150 160

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Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys Arg Phe Leu 185 190

Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val Thr Tyr Asn Gly 195 200 205

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Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr Tyr Thr Leu 265 270

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Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn Leu Glu Arg 290 295 300

Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr Glu Leu Gly 305 310 315

Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu Val Gly Gln 325 330 335

Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu Val Glu Trp 340 350

Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala Pro Asn Lys 355 360 365 Page 48

Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser Tyr Thr Gly 370 380

Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn Ile Val Tyr 385 390 395 400

Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val 405 410 415

Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr Asp Ile Ala 420 430

Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly Phe Ile Pro 435 440 445

Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile Lys Thr Lys 450 455 460

Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu Asp Tyr Arg 465 470 475 480

Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly Tyr Tyr Gly 485 490 495

Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser Val Thr 500 505 510

Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu Leu Glu Glu 515 525

Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly Leu Tyr Ala 530 540

Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys Lys Ala Leu Glu 545 550 555 560

Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu Glu Leu Glu 565 570 575

Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys Arg Tyr 580 585 590

Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly Leu Glu Ile 595 600 605

Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala Arg Val Page 49 Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu Ala Val Arg Ile 625 630 635 640

Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile Pro Pro Glu 645 650 655

Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His Glu Tyr Lys 660 665 670

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Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val Leu Arg Gly 690 695 700

Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu Tyr Asp Pro 705 710 715 720

Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Val Leu 725 730 735

Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg Lys Glu Asp
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gac Asp	ctt Leu	ccc Pro	tat Tyr 180	' Va i	gac Asp	gtc Val	gtt Val	tcc Ser 185	unr	gag Glu	aag Lys	gag Glu	atg Met 190		aag Lys		576
cgc Arg	ttc Phe	cto Leu 195	ı Lys	gto Val	gtc Val	aag Lys	gaa Glu 200	Lys	gat Asp	ccc Pro	gac Asp	gto Val 205	LEC	ata ille	acc Thr		624
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aag Lys 225	Leu	gga Gly	a gto ⁄Va	aag Lys	g tto s Phe 230	: I16	cto Lei	c gga u Gly	agg Arg	gaa Glu 235	i Giy	g ago / Ser	gaç Gli	g ccg u Pro	aaa Lys 240		720
ato	cag Glr	g cgo Aro	c ato	g ggd t Gly 24	y AS	cgo Arg	tti Pho	t gcg e Ala	g gtg Va 250	GIL	g gto u Val	aaq Lys	g gga s Gly	a agg y Arg 25:	att ile		768

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Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asm Ile 170 Page 54

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Phe Tyr His Glu Gly Asp Glu Phe Gly Lys Gly Glu Ile Ile Met Ile 145 150 155 160

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Arg Ile His Phe Asp Leu Phe Pro Val Val Arg Arg Thr Ile Asn Leu 260 265 270

Pro Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Leu Gly Lys Thr 275 280 285 Page 73

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His Phe Gln Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile
Asp Glu Ile Lys Ala Ile Lys Gly Glu Arg His Gly Lys Ile Val Arg
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Glu Val Trp Lys Leu Ile Phe Glu His Pro Gln Asp Val Pro Ala Leu
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Tyr Asn Gly Asp Asn Phe Asp Leu Pro Tyr Leu Ile Lys Arg Ala Glu 210 215 220

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Lys Gly Val Lys Val Lys Pro Gly Met Val Ile Gly Tyr Ile Val Leu 690 695 700

Arg Gly Asp Gly Pro Ile Ser Lys Arg Ala Ile Ala Ile Glu Glu Phe 705 710 715 720

Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln
725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750

Glu Asp Leu Lys Tyr Gln Lys Thr Lys Gln Val Gly Leu Gly Ala Trp 755 760 765

Leu Lys Phe 770

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Asn Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Ala Ile 35 40 45

Asp Glu Ile Lys Lys Ile Thr Ala Gln Arg His Gly Lys Val Val Arg 50 60

Ile Val Glu Thr Glu Lys Ile Gln Arg Lys Phe Leu Gly Arg Pro Ile 65 70 75 80

Glu Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr $100 \hspace{1cm} 105 \hspace{1cm} 110$

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Thr Pro 115 120 125

Met Glu Gly Asn Glu Lys Leu Thr Phe Leu Ala Val Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Val Ile Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Glu Gly Ala Lys Val Ile Thr Trp Lys Lys Ile 165 170 175

Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys 180 185 190

Arg Leu Ile Arg Val Ile Lys Glu Lys Asp Pro Asp Val Ile Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Pro Tyr Leu Leu Lys Arg Ala Glu 210 215 220

1.46	1 011	clv	т]д	LVS	l eu	Leu	Leu	sequ Glv	ience Ara	lis Asp	ting Asn :	.txt Ser	Glu	Pro	Lys
225	Leu	ч	116	Lys	230	LCu		σ.,	9	235					240
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His	Phe	Asp	Leu 260	Phe	Pro	val	Ile	Arg 265	Arg	Thr	Ile.	Asn	Leu 270	Pro	Thr
Tyr	Thr	Leu 275	Glu	Ala	٧a٦	Tyr	G1u 280	Ala	Ile	Phe	Gly	Lys 285	Pro	Lys	Glu
Lys	Va1 290		Ala	Asp	Glu	Ile 295	Ala	Lys	Ala	Trp	Glu 300	Thr	Gly	Glu	Gly
Leu 305	Glu	Arg	۷a٦	Ala	Lys 310	туг	Ser	Met	Glu	Asp 315	Ala	Lys	۷al	Thr	Tyr 320
Glu	Leu	Gly	Arg	Glu 325	Phe	Phe	Pro	Met	G]u 330	Ala	Gln	Leu	Ala	Arg 335	Leu
۷a٦	Gly	G]n	Pro 340		Тгр	Asp	۷al	Ser 345	Arg	Ser	Ser	Thr	Gly 350	Asn	Leu
val	Glu	Trp 355	Phe	. Leu	ı Leu	Arg	Lys 360	Ala	Tyr	Glu	Arg	Asn 365	Glu	Leu	
Pro	Asr 370	ı Lys	s Pro) Asp	Glu	Lys 375	Glu	Tyr	· Glu	ı Arg	Arg 380	Leu	Arg	Glu	Ser
Tyr 385		ı Gly	/ Gly	/ Tyr	· val 390	Lys)	G]u	Pro	o Glu	1 Lys 395	Gly	Leu	Trp	Glu	Gly 400
Ιle	e Va	l Se	r Lei	ı Asp 40:	Phe	e Arg	, Ser	. Lei	ı Tyr 410	Pro	Ser	Ile	Ile	Ile 415	Thr
His	s Ası	n Va	1 Sei 420	r Pro	o Asp	Thr	· Lei	ı Asr 425	n Arg	g Glu	ıGly	Cys	Glu 430	Glu)	Tyr
Ası	o Va	1 A1 43		o Ly:	s Va	l Gly	/ His 440	s Arg	g Phe	e Cys	. Lys	Asp 445	Phe	Pro	Gly
Ph	e Il 45	e Pr O	o Se	r Le	u Lei	u Gly 45	y Gli 5	n Lei	u Lei	u Glu	a Glu 460	Arg	g Glr	ı Lys	: Ile
Ly 46	s Ly 5	s Ar	д Ме	t Ly	s G10 470	u Se O	r Ly:	s As	p Pr	o Va 47!	l Glu S	ı Lys	s Lys	s Lei	Leu 480

Asp Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Ile Leu Pro 485 490 495

Asp Glu Trp Leu Pro Ile Val Glu Asn Glu Lys Val Arg Phe Val Lys 500 505 510

Ile Gly Asp Phe Ile Asp Arg Glu Ile Glu Glu Asn Ala Glu Arg Val 515

Lys Arg Asp Gly Glu Thr Glu Ile Leu Glu Val Lys Asp Leu Lys Ala 530 540

Leu Ser Phe Asn Arg Glu Thr Lys Lys Ser Glu Leu Lys Lys Val Lys 545 550 560

Ala Leu Ile Arg His Arg Tyr Ser Gly Lys Val Tyr Ser Ile Lys Leu 565 570 575

Lys Ser Gly Arg Arg Ile Lys Ile Thr Ser Gly His Ser Leu Phe Ser 580 585 590

Val Lys Asn Gly Lys Leu Val Lys Val Arg Gly Asp Glu Leu Lys Pro 595 600 605

Gly Asp Leu Val Val Val Pro Gly Arg Leu Lys Leu Pro Glu Ser Lys 610 615 620

Gln Val Leu Asn Leu Val Glu Leu Leu Leu Lys Leu Pro Glu Glu Glu 625 630 640

Thr Ser Asn Ile Val Met Met Ile Pro Val Lys Gly Arg Lys Asn Phe 645 650 655

Phe Lys Gly Met Leu Lys Thr Leu Tyr Trp Ile Phe Gly Glu Gly Glu 660 665

Arg Pro Arg Thr Ala Gly Arg Tyr Leu Lys His Leu Glu Arg Leu Gly 675 680

Tyr Val Lys Leu Lys Arg Arg Gly Cys Glu Val Leu Asp Trp Glu Ser 690 695 700

Leu Lys Arg Tyr Arg Lys Leu Tyr Glu Thr Leu Ile Lys Asn Leu Lys 705 710 715 720

Tyr Asn Gly Asn Ser Arg Ala Tyr Met Val Glu Phe Asn Ser Leu Arg 730 735 Page 89

Asp Val Val Ser Leu Met Pro Ile Glu Glu Leu Lys Glu Trp Ile Ile 740 745 750

Gly Glu Pro Arg Gly Pro Lys Ile Gly Thr Phe Ile Asp Val Asp Asp 755 760 765

Ser Phe Ala Lys Leu Leu Gly Tyr Tyr Ile Ser Ser Gly Asp Val Glu 770 780

Lys Asp Arg Val Lys Phe His Ser Lys Asp Gln Asn Val Leu Glu Asp 785 790 795

Ile Ala Lys Leu Ala Glu Lys Leu Phe Gly Lys Val Arg Arg Gly Arg 805 810 815

Gly Tyr Ile Glu Val Ser Gly Lys Ile Ser His Ala Ile Phe Arg Val 820 825 830

Leu Ala Glu Gly Lys Arg Ile Pro Glu Phe Ile Phe Thr Ser Pro Met 835 840 845

Asp Ile Lys Val Ala Phe Leu Lys Gly Leu Asn Gly Asn Ala Glu Glu 850 860

Leu Thr Phe Ser Thr Lys Ser Glu Leu Leu Val Asn Gln Leu Ile Leu 865 870 880

Leu Leu Asn Ser Ile Gly Val Ser Asp Ile Lys Ile Glu His Glu Lys 885 890 895

Gly Val Tyr Arg Val Tyr Ile Asn Lys Lys Glu Ser Ser Asn Gly Asp 900 905 910

Ile Val Leu Asp Ser Val Glu Ser Ile Glu Val Glu Lys Tyr Glu Gly 915 925

Tyr Val Tyr Asp Leu Ser Val Glu Asp Asn Glu Asn Phe Leu Val Gly 930 935 940

Phe Gly Leu Leu Tyr Ala His Asn Ser Tyr Tyr Gly Tyr Gly Tyr 945 950 955 960

Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser Val Thr Ala 965 970 975

Trp Gly Arg Gln Tyr Ile Asp Leu Val Arg Arg Glu Leu Glu Ala Arg Page 90 Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly Leu Tyr Ala Thr Ile 995 1000

Pro Gly Val Lys Asp Trp Glu Glu Val Lys Arg Arg Ala Leu Glu 1010 1015 1020

Phe Val Asp Tyr Ile Asn Ser Lys Leu Pro Gly Val Leu Glu Leu 1025 1030 1035

Glu Tyr Glu Gly Phe Tyr Ala Arg Gly Phe Phe Val Thr Lys Lys 1040 1050

Lys Tyr Ala Leu Ile Asp Glu Glu Gly Lys Ile Val Thr Arg Gly 1055 1060

Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr 1070 1080

Gln Ala Arg Val Leu Glu Ala Ile Leu Lys His Gly Asn Val Glu 1085 1090 1095

Glu Ala Val Lys Ile Val Lys Asp Val Thr Glu Lys Leu Thr Asn 1100 1105 1110

Tyr Glu Val Pro Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr 1115 1120 1125

Arg Pro Ile Asn Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val 1130 1140

Ala Lys Arg Leu Met Ala Arg Gly Ile Lys Val Lys Pro Gly Met 1145 1150 1155

Val Ile Gly Tyr Ile Val Leu Arg Gly Asp Gly Pro Ile Ser Lys 1160 1165 1170

Arg Ala Ile Ser Ile Glu Glu Phe Asp Pro Arg Lys His Lys Tyr 1175 1180 1185

Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Val Leu Pro Ala Val Glu 1190 1200

Arg Ile Leu Lys Ala Phe Gly Tyr Lys Arg Glu Asp Leu Arg Trp 1205 1210 1215

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Phe Ile Pro Ser Leu Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile 450 455 460

Lys Lys Arg Met Lys Glu Ser Lys Asp Pro Val Glu Lys Lys Leu Leu 465 470 475 480

Asp Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly 485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 505 510

Ser Val Thr Ala Trp Gly Arg Gln Tyr Ile Asp Leu Val Arg Arg Glu 515 520

Leu Glu Ser Ser Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly Leu 530 540

Tyr Ala Thr Ile Pro Gly Ala Lys Pro Asn Glu Ile Lys Glu Lys Ala 545 550 560

Leu Lys Phe Val Glu Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu Glu 565 570 575

Leu Glu Tyr Glu Gly Phe Tyr Ala Arg Gly Phe Phe Val Thr Lys Lys 580 585 590

Lys Tyr Ala Leu Ile Asp Glu Glu Gly Lys Ile Val Thr Arg Gly Leu 595 600 605

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620

Lys Val Leu Glu Ala Ile Leu Lys His Gly Asn Val Asp Glu Ala Val 625 630 635 640

Lys Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Ile Pro 645 650 655

Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Pro Leu Ser Glu 660 665 670

Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 680 685

Lys Gly Val Lys Val Lys Pro Gly Met Val Ile Gly Tyr Ile Val Leu 690 695 700
Page 94

Arg Gly Asp Gly Pro Ile Ser Lys Arg Ala Ile Ala Ile Glu Glu Phe 705 710 715 720

Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln 725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750

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Asn Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Gln Ile 35 40 45

Asp Glu Val Arg Lys Ile Thr Ala Glu Arg His Gly Lys Ile Val Arg 50 60

Glu Val Trp Arg Leu Tyr Phe Glu His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Glu His Ser Ala Val Ile Asp Ile Phe Glu Tyr 100 . 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Leu Leu Ala Phe Asp Ile Glu Thr 130 135 140 Page 95

Leu Tyr His Glu Gly Glu Glu Phe Ala Lys Gly Pro Ile Ile Met Ile 145 150 155 160 Ser Tyr Ala Asp Glu Glu Glu Ala Lys Val Ile Thr Trp Lys Lys Ile 165 170 175 Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys 180 185 190 Arg Phe Leu Lys Val Ile Arg Glu Lys Asp Pro Asp Val Ile Ile Thr 195 200 205 Tyr Asn Gly Asp Ser Phe Asp Leu Pro Tyr Leu Val Lys Arg Ala Glu 210 215 220 Lys Leu Gly Ile Lys Leu Pro Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 240 Met Gln Arg Leu Gly Asp Met Thr Ala Val Glu Ile Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr His Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 265 270 Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu 275 280 285 Lys Val Tyr Ala His Glu Ile Ala Glu Ala Trp Glu Thr Gly Lys Gly Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 320 Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350 Val Glu Trp Tyr Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Tyr Glu Arg Arg Leu Arg Glu Ser 370 375 380 Tyr Ala Gly Gly Tyr Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Gly Page 96

Leu Val Ser Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr 405 410 415

His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Glu Tyr 420 425 430

Asp Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly 435 440 445

Phe Ile Pro Ser Leu Leu Lys Arg Leu Leu Asp Glu Arg Gln Glu Ile 450 455 460

Lys Arg Lys Met Lys Ala Ser Lys Asp Pro Ile Glu Lys Lys Met Leu 465 470 475 480

Asp Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly
485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 510

Ser Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Phe Val Arg Lys Glu 515 525

Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly 530 540

Leu Tyr Ala Thr Ile Pro Gly Ala Lys Pro Glu Glu Ile Lys Lys 545 550 560

Ala Leu Glu Phe Val Asp Tyr Ile Asn Ala Lys Leu Pro Gly Leu Leu 565 570 575

Glu Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys 580 585 590

Lys Lys Tyr Ala Leu Ile Asp Glu Glu Gly Lys Ile Ile Thr Arg Gly 595 600 605

Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln 610 620

Ala Lys Val Leu Glu Ala Ile Leu Lys His Gly Asn Val Glu Glu Ala 625 630 635 640 val Lys Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Ile
645 650 655 Pro Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Pro Leu His 660 665 670 Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Arg Leu Ala 675 680 685 Ala Arg Gly Val Lys Val Arg Pro Gly Met Val Ile Gly Tyr Ile Val 690 695 700 Leu Arg Gly Asp Gly Pro Ile Ser Lys Arg Ala Ile Leu Ala Glu Glu 705 710 715 720 Phe Asp Leu Arg Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn 725 730 735 Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Ala Phe Gly Tyr Arg 740 745 750 Lys Glu Asp Leu Arg Trp Gln Lys Thr Lys Gln Thr Gly Leu Thr Ala 755 760 765 Trp Leu Asn Ile Lys Lys Lys 770 775 <210> 89 <211> 775 PRT Pyrococcus furiosus <400> Met Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val Ile 1 5 10 Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp Arg 20 25 30 Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys Ile 35 40 45 Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg 50 55 60 Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile 65 70 75 80

Thr	val	Тгр	Lys	Leu 85	Tyr	Leu	Glu	sequ His	ence Pro 90	lis Gln	ting Asp	.txt Val	Pro	Thr 95	Ile
Arg	Glu	Lys	val 100	Arg	Glu	His	Pro	А]а 105	val	val	Asp	Ile	Phe 110	Glu	Tyr
Asp	Ile	Pro 115	Phe	Ala	Lys	Arg	Tyr 120	Leu	Ile	Asp	Lys	Gly 125	Leu	Ile	Pro
Met	Glu 130	Gly	Glu	Glu	Glu	Leu 135	Lys	Ile	Leu	Ala	Phe 140	Asp	Ile	Glu	Thr
Leu 145	Туг	His	Glu	Gly	Glu 150	Glu	Phe	Gly	Lys	Gly 155	Pro	Ile	Ile	Met	11e 160
Ser	туг	Ala	Asp	Glu 165	Asn	Glu	Ala	Lys	Val 170	Ile	Thr	Trp	Lys	Asn 175	Ile
Asp	Leu	Pro	туг 180	Val	Glu	۷al	val	Ser 185	Ser	Glu	Arg	Glu	Met 190	Ile	Lys
Arg	Phe	Leu 195	Arg	Ile	Ile	Arg	G]u 200	Lys	Asp	Pro	Asp	11e 205	Ile	val	Thr
Tyr	Asn 210	Gly	Asp	ser	Phe	Asp 215	Phe	Pro	Tyr	Leu	Ala 220	Lys	Arg	Ala	Glu
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Met	: Gln	ı Arg	, Ile	Gly 245	/ Asp	Met	: Thr	Ala	val 250	Glu)	val	Lys	Gly	Arg 255	Ile
His	Phe	e Asp	260	Tyr	· His	va]	Ile	Thr 265	Arg	j Thr	·Ile	Asn	Leu 270	Pro	Thr
Tyr	- Thr	- Lei 27:		ı Ala	ı Val	Туг	- Glu 280	ı Ala)	ıle	e Phe	e Gly	Lys 285	Pro	Lys	Glu
Lys	s Va 290		r Ala	ı Asp	o Glu	ı Ile 29:	a Ala	ı Lys	s Ala	a Trp	300	Ser	· Gly	Glu	ı Asn
Lei 30		u Ar	g Va	l Ala	a Lys 310		r Sei	- Me1	t Glu	ı Asp 31	Ala 5	Lys	s Ala	t Thr	туг 320
Gl	u Lei	u Gl	y Ly:	s Gli 32	u Phe	e Le	u Pro	o Me	t Gli 330	u Ile O	e Glr	ı Lei	ı Sei	335	j Leu

Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala 355 360 365

Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser 370 375 380

Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn 385 390 395 400

Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr 405 410 415

His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr 420 425 430

Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly 435 440 445

Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile 450 455 460

Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu 465 470 475 480

Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly
485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu 500 505

Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu 515 525

Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly 530 535

Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys 545 550 560

Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu 565 570 575

Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys 580 585 590 Page 100

Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly 595 605

Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln 610 620

Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu Ala 625 630 640

Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile 645 650 655

Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His 660 665 670

Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu Ala 675 680 685

Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val 690 695 700

Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu 705 710 715 720

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Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg 740 745 750

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Glu Glu Ile Lys Lys Ile Thr Ala Glu Arg His Gly Arg Val Val Lys 50 60

Val Lys Arg Ala Glu Lys Val Lys Lys Phe Leu Gly Arg Ser Val 65 70 75 80

Glu Val Trp Val Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Lys His Pro Ala Val Ile Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Glu Glu Glu Leu Lys Leu Met Ser Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Gly Thr Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Ser Glu Ala Arg Val Ile Thr Trp Lys Lys Ile 165 170 175

Asp Leu Pro Tyr Val Glu Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu 210 215 220

Lys Leu Gly Val Ser Phe Thr Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 230 240

Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Val 245 250 255

His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Phe Gly Lys Pro Lys Glu Page 102

280 275 Lys val Tyr Ala Glu Glu Ile Ala Thr Ala Trp Glu Thr Gly Glu Gly 300 290 Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Arg Val Thr 305 310 315 Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335 Ile Gly Gln Gly Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr 370 375 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile 385 390 395 400 Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His 405 410 415 Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp 420 430 Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445

Ile Pro Ser Leu Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys 450 455 460

Arg Lys Met Lys Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp 465 470 475 480

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr 485 490 495

Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser 500 505 510

Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu 515 520 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
530 535 540 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Ala 545 550 560 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys 580 585 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu 595 600 605 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 615 620 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val 625 630 640 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Glu Leu Lys Asp 660 Tyr Lys Ala Thr Gly Pro His Val Ala Ile Ala Lys Arg Leu Ala Ala 675 680 685 Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700 Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720 Asp Pro Thr Lys His Lys Tyr Asp Ala Asp Tyr Tyr Ile Glu Asn Gln 725 730 735 Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750 Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Gly Ala Trp 755 760 765 Leu Lys Pro Lys Gly Lys Lys Lys 770 775

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Thermococcus sp.

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Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40

Glu Asp Val Lys Lys Val Thr Ala Lys Arg His Gly Thr Val Val Lys 50 55 60

Val Lys Arg Ala Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro Ile 65 70 80

Glu Val Trp Lys Leu Tyr Phe Asn His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Arg Ile Arg Ala His Pro Ala Val Val Asp Ile Tyr Glu Tyr

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Thr Met Leu Ala Phe Asp Ile Glu Thr

Leu Tyr His Glu Gly Glu Glu Phe Gly Thr Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Gly Ser Glu Ala Arg Val Ile Thr Trp Lys Lys Ile 165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Val Val Arg Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu 210 215 220

Glu Leu Gly Ile Lys Phe Thr Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 230 240 Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Phe Gly Lys Pro Lys Glu 275 280 285 Lys Val Tyr Ala Glu Glu Ile Ala Gln Ala Trp Glu Ser Gly Glu Gly 290 295 300 Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 320 Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu Ile Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Lys Arg Asn Glu Leu Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr 370 375 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile 385 390 395 Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Lys Glu Tyr Asp 420 430 Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Ile Lys 450 460 Arg Lys Met Lys Ala Thr Val Asp Pro Leu Glu Lys Lys Leu Leu Asp 475

Page 106

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Phe Tyr Gly Tyr 485 490 495

Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser 500 505

Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu 515 520 525

Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu 530 535 540

His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala 545 550 555 560

Lys Glu Phe Leu Lys Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu 565 570 575

Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys 580 585 590

Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu 595 600 605

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620

Arg Val Leu Glu Ala Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 640

Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro 645 650 655

Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Asp Leu Arg Asp 660 670

Tyr Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 680 685

Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700

Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Ala Asp Glu Phe 705 710 715

Asp Pro Thr Lys His Arg Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Page 107 Val Leu Pro Ala Val Glu Arg Ile Leu Lys Ala Phe Gly Tyr Arg Lys 740 745 750

Glu Asp Leu Arg Tyr Gln Lys Thr Lys Gln Val Gly Leu Gly Ala Trp 755 760 765

Leu Lys Val Lys Gly Lys Lys 770 775

<210> 92

<211> 1671

<212> PRT

<213> Pyrococcus sp.

<400> 92

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Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Tyr Asp Arg 20 25 30

Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40 45

Glu Glu Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Val Val Thr 50 60

Val Lys Arg Val Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro Val 65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Ile Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Val Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 160

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Val Page 108 Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Arg Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu 210 215 220

Lys Leu Gly Ile Asn Phe Ala Leu Gly Arg Asp Gly Ser Glu Pro Lys 225 230 235 240

Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255

His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Phe Gly Gln Pro Lys Glu 275 280 285

Lys Val Tyr Ala Glu Glu Ile Thr Thr Ala Trp Glu Thr Gly Glu Asn 290 295 300

Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315

Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335

Ile Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365

Pro Asn Lys Pro Asp Glu Lys Glu Leu Ala Arg Arg Gln Ser Tyr 370 375

Glu Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile 385 390 395 400

Val Tyr Leu Asp Phe Arg Cys His Pro Ala Asp Thr Lys Val Val 405 410 415

Lys	Gly	Lys	G]y 420	Ile	Ile	Asn	Ile	sequ Ser 425	Glu	val	Gln	Glu	Gly / 430	Asp [Tyr
val	Leu	Gly 435	Ile	Asp	Gly	Trp	Gln 440	Arg	val	Arg	Lys	Val 445	Trp	Glu '	Tyr
Asp	Tyr 450	Lys	Gly	Glu	Leu	Val 455	Asn	Ile	Asn	Gly	Leu 460	Lys	Cys	Thr	Pro
Asn 465	ніѕ	Lys	Leu	Pro	val 470	val	Thr	Lys	Asn	G1u 475	Arg	Gln	Thr	Arg	Ile 480
Arg	Asp	Ser	Leu	Ala 485	Lys	Ser	Phe	Leu	Thr 490	Lys	Lys	val	Lys	Gly 495	Lys
Ile	Ile	Thr	Thr 500	Pro	Leu	Phe	Tyr	Glu 505	Ile	Gly	Arg	Ala	Thr 510	Ser	Glu
Asn	īle	Pro 515	Glu	Glu	Glu	val	Leu 520	Lys	Gly	Glu	Leu	Ala 525	Gly	Ile	Leu
Leu	Ala 530	Glu	Gly	Thr	Leu	Leu 535	Arg	Lys	Asp	val	G1u 540	Tyr	Phe	Asp	Ser
Ser 545	Arg	Lys	Lys	Arg	Arg 550	Ile	Ser	His	Gln	туг 555	Arg	val	Glu	Ile	Thr 560
Ile	Gly	Lys	Asp	G]u 565	Glu	Glu	Phe	Arg	Asp 570	Arg	Ile	Thr	Tyr	Ile 575	Phe
Glu	ı Arg	, Leu	Phe 580	Gly	' Ile	Thr	Pro	Ser 585	Ile	Ser	Glu	Lys	Lys 590	Gly	Thr
Asr	ı Ala	val 595		Lei	ı Lys	∨a1	Ala 600	Lys	Lys	Asn	۷a۱	туг 605	Leu	Lys	val
Lys	610		e Met	: Asp) Asn	1]e 615	Glu	Ser	Leu	His	Ala 620	Pro	Ser	val	Leu
Arg 62		/ Phe	e Phe	e Glu	u Gly 630		o Gly	' Ser	' ∨al	Asn 635	Arg	val	Arg	Arg	Ser 640
Ιle	e Va	l Ala	a Thi	- Gli 64:	n Gly 5	/ Thi	Lys	. Asr	G]u 650	ı Trp)	Lys	Ile	Lys	Leu 655	val
se	r Ly:	s Le	u Lei 660	u Se	r Glr	ı Lei	ı Gly	/ Ile 665	Pro	His	G]n	Thr	Tyr 670	Thr	туг

Gln Tyr Gln Glu Asn Gly Lys Asp Arg Ser Arg Tyr Ile Leu Glu Ile 675 680 685

Thr Gly Lys Asp Gly Leu Ile Leu Phe Gln Thr Leu Ile Gly Phe Ile 690 695 700

Ser Glu Arg Lys Asn Ala Leu Leu Asn Lys Ala Ile Ser Gln Arg Glu 705 710 715 720

Met Asn Asn Leu Glu Asn Asn Gly Phe Tyr Arg Leu Ser Glu Phe Asn 725 730 735

Val Ser Thr Glu Tyr Tyr Glu Gly Lys Val Tyr Asp Leu Thr Leu Glu 740 745 750

Gly Thr Pro Tyr Tyr Phe Ala Asn Gly Ile Leu Thr His Asn Ser Leu 755 760 765

Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn 770 775 780

Arg Glu Gly Cys Lys Glu Tyr Asp Val Ala Pro Gln Val Gly His Arg 785 790 795 800

Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu Leu Gly Asp Leu 805 810 815

Leu Glu Glu Arg Gln Lys Ile Lys Lys Lys Met Lys Ala Thr Ile Asp 820 830

Pro Ile Glu Arg Lys Leu Leu Asp Tyr Arg Gln Arg Ala Ile Lys Ile 835 840 845

Leu Ala Asn Ser Ile Leu Pro Glu Glu Trp Leu Pro Val Leu Glu Glu 850 855 860

Gly Glu Val His Phe Val Arg Ile Gly Glu Leu Ile Asp Arg Met Met 865 870 875

Glu Glu Asn Ala Gly Lys Val Lys Arg Glu Gly Glu Thr Glu Val Leu 885 890 895

Glu Val Ser Gly Leu Glu Val Pro Ser Phe Asn Arg Arg Thr Asn Lys 900 905 910

Ala Glu Leu Lys Arg Val Lys Ala Leu Ile Arg His Asp Tyr Ser Gly 915 920 925 Page 111

- Lys Val Tyr Thr Ile Arg Leu Lys Ser Gly Arg Arg Ile Lys Ile Thr 930 935 940
- Ser Gly His Ser Leu Phe Ser Val Arg Asn Gly Glu Leu Val Glu Val 945 950 955 960
- Thr Gly Asp Glu Leu Lys Pro Gly Asp Leu Val Ala Val Pro Arg Arg 965 970 975
- Leu Glu Leu Pro Glu Arg Asn His Val Leu Asn Leu Val Glu Leu Leu 980 985 990
- Leu Gly Thr Pro Glu Glu Glu Thr Leu Asp Ile Val Met Thr Ile Pro 995 1000 1005
- Val Lys Gly Lys Lys Asn Phe Phe Lys Gly Met Leu Arg Thr Leu 1010 1020
- Arg Trp Ile Phe Gly Glu Glu Lys Arg Pro Arg Thr Ala Arg Arg 1025 1030
- Tyr Leu Arg His Leu Glu Asp Leu Gly Tyr Val Arg Leu Lys Lys 1040 1045 1050
- Ile Gly Tyr Glu Val Leu Asp Trp Asp Ser Leu Lys Asn Tyr Arg 1055 1060 1065
- Arg Leu Tyr Glu Ala Leu Val Glu Asn Val Arg Tyr Asn Gly Asn 1070 1075 1080
- Lys Arg Glu Tyr Leu Val Glu Phe Asn Ser Ile Arg Asp Ala Val 1085 1090 1095
- Gly Ile Met Pro Leu Lys Glu Leu Lys Glu Trp Lys Ile Gly Thr 1100 1110
- Leu Asn Gly Phe Arg Met Arg Lys Leu Ile Glu Val Asp Glu Ser 1115 1120 1125
- Leu Ala Lys Leu Leu Gly Tyr Tyr Val Ser Glu Gly Tyr Ala Arg 1130 1135 1140
- Lys Gln Arg Asn Pro Lys Asn Gly Trp Ser Tyr Ser Val Lys Leu 1145 1150 1155
- Tyr Asn Glu Asp Pro Glu Val Leu Asp Asp Met Glu Arg Leu Ala Page 112

Ser Arg Phe Phe Gly Lys Val Arg Arg Gly Arg Asn Tyr Val Glu 1175 1180 1185

1165

Val Leu Ala Glu Asn Lys Arg Ile Pro Glu Phe Val Phe Thr Ser 1205 1215

Pro Lys Gly Val Arg Leu Ala Phe Leu Glu Gly Tyr Phe Ile Gly 1220 1230

Asp Gly Asp Val His Pro Asn Lys Arg Leu Arg Leu Ser Thr Lys 1235 1240 1245

Ser Glu Leu Leu Ala Asn Gln Leu Val Leu Leu Leu Asn Ser Val 1250 1260

Gly Val Ser Ala Val Lys Leu Gly His Asp Ser Gly Val Tyr Arg 1265 1270 1275

Val Tyr Ile Asn Glu Glu Leu Pro Phe Val Lys Leu Asp Lys Lys 1280 1285 1290

Lys Asn Ala Tyr Tyr Ser His Val Ile Pro Lys Glu Val Leu Ser 1295 1300 1305

Glu Val Phe Gly Lys Val Phe Gln Lys Asn Val Ser Pro Gln Thr 1310 1315 1320

Phe Arg Lys Met Val Glu Asp Gly Arg Leu Asp Pro Glu Lys Ala 1325 1330 1335

Gln Arg Leu Ser Trp Leu Ile Glu Gly Asp Val Val Leu Asp Arg 1340 1345 1350

Val Glu Ser Val Asp Val Glu Asp Tyr Asp Gly Tyr Val Tyr Asp 1355 1360 1365

Leu Ser Val Glu Asp Asn Glu Asn Phe Leu Val Gly Phe Gly Leu 1370 1380

Val Tyr Ala His Asn Ser Tyr Tyr Gly Tyr Tyr Gly Tyr Ala Arg 1385 1390 1395

sequence listing.txt Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser Val Thr Ala Trp 1400 1405 1410 Gly Arg Glu Tyr Ile Thr Met Thr Ile Lys Glu Ile Glu Glu Lys Tyr Gly Phe Lys Val Ile Tyr Ser Asp Thr Asp Gly Phe Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Ala Met Glu Phe Leu Lys Tyr Ile Asn Ala Lys Leu Pro Gly Ala Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg 1500 Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu 1510 1505 Thr Gln Ala Arg Val Leu Glu Ala Leu Leu Lys Asp Gly Asp Val 1530 1520 Glu Lys Ala Val Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser 1535 1540 1545 Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile His Glu Gln Ile 1555 Thr Arg Asp Leu Lys Asp Tyr Lys Ala Thr Gly Pro His Val Ala 1565 1570 1575 Val Ala Lys Arg Leu Ala Ala Arg Gly Val Lys Ile Arg Pro Gly 1580 Thr Val Ile Ser Tyr Ile Val Leu Lys Gly Ser Gly Arg Ile Gly 1600 Asp Arg Ala Ile Pro Phe Asp Glu Phe Asp Pro Thr Lys His Lys 1610 1620 Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Val Leu Pro Ala Val 1625 1630 1635

Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys Glu Asp Leu Arg 1640 1645 1650

Tyr Gln Lys Thr Arg Gln Val Gly Leu Ser Ala Trp Leu Lys Pro 1655 1660 1665

Lys Gly Thr 1670

<210> 93

<211> 773

<212> PRT

<213> Thermococcus sp.

<400> 93

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Asn Phe Glu Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40 45

Glu Asp Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Thr Val Arg 50 60

Val Val Arg Ala Glu Lys Val Lys Lys Lys Phe Leu Gly Arg Pro Ile 65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Lys Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr
100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Ile 165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190

Arg Phe Leu Lys Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Ser Glu 210 215 220

Lys Leu Gly Val Lys Phe Ile Leu Gly Arg Glu Gly Ser Glu Pro Lys 225 230 235 240

Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255

His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Gln Pro Lys Glu 275 280 285

Lys Val Tyr Ala Glu Glu Ile Ala Gln Ala Trp Glu Thr Gly Glu Gly 290 295 300

Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 320

Glu Leu Gly Lys Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335

Val Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365

Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Glu Ser Tyr 370 375 380

Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile 385 390 395 400

Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His 405 410 415

Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Glu Glu Tyr Asp 420 425 430 Page 116

Val Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445

Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Val Lys 450 455 460

Lys Lys Met Lys Ala Thr Ile Asp Pro Ile Glu Lys Lys Leu Leu Asp 465 470 480

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Phe Tyr Gly Tyr 485 490 495

Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser 500 505

Val Thr Ala Trp Gly Arg Gln Tyr Ile Glu Thr Thr Ile Arg Glu Ile 515 525

Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Phe 530 540

Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala 545 550 560

Lys Glu Phe Leu Asp Tyr Ile Asn Ala Lys Leu Pro Gly Leu Leu Glu 565 570 575

Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys 580 585

Lys Tyr Ala Val Ile Asp Glu Glu Asp Lys Ile Thr Thr Arg Gly Leu 595 605

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 615 620

Arg Val Leu Glu Ala Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 635 640

Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro 645 650 655

Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Asp Leu Lys Asp 660 665 670

Tyr Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala Page 117 Arg Gly Ile Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700

Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720

Asp Pro Ala Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln 725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750

Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Gly Ala Trp. 755 760 765

Leu Lys Pro Lys Thr 770

<210> 94

<211> 1523

<212> PRT

<213> Thermococcus fumicolans

<400> 94

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Arg Val Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Tyr Asp Arg 20 25 30

Asp Phe Glu Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40 45

Glu Asp Val Lys Lys Ile Thr Ala Ser Arg His Gly Thr Thr Val Arg 50 60

Val Val Arg Ala Gly Lys Val Lys Lys Lys Phe Leu Gly Arg Pro Ile 65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro Page 118 Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile 145 150 150

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Lys Ile 165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190

Arg Phe Leu Lys Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Ser Glu 210 215

Lys Leu Gly Val Lys Phe Ile Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 240

Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255

His Phe Asp Leu Tyr Pro Val Ile Arg His Thr Ile Asn Leu Pro Thr 260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Gln Pro Lys Glu 275 280 285

Lys Val Tyr Ala Glu Glu Ile Ala Gln Ala Trp Glu Thr Gly Glu Gly 290 295 300

Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 320

Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335

Val Gly Gln Ser Phe Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 350

Val Glu Trp Tyr Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala 355 360 365

sequence listing.txt Pro Asn Lys Pro Ser Gly Arg Glu Leu Glu Arg Arg Arg Gly Gly Tyr 370 375 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile 385 390 395 400 Ala Tyr Leu Asp Phe Arg Cys His Pro Ala Asp Thr Lys Val Ile Val 405 410 415 Lys Gly Lys Gly Val Val Asn Ile Ser Glu Val Arg Glu Gly Asp Tyr 420 425 430 Val Leu Gly Ile Asp Gly Trp Gln Lys Val Gln Arg Val Trp Glu Tyr 435 440 445 Asp Tyr Glu Gly Glu Leu Val Asn Ile Asn Gly Leu Lys Cys Thr Pro 450 460 Asn His Lys Leu Pro Val Val Arg Arg Thr Glu Arg Gln Thr Ala Ile 465 470 475 480 Arg Asp Ser Leu Ala Lys Ser Phe Leu Thr Lys Lys Val Lys Gly Lys 485 490 495 Leu Ile Thr Thr Pro Leu Phe Glu Lys Ile Gly Lys Ile Glu Arg Glu 500 505 Asp Val Pro Glu Glu Glu Ile Leu Lys Gly Glu Leu Ala Gly Ile Ile 515 520 525 Leu Ala Glu Gly Thr Leu Leu Arg Lys Asp Val Glu Tyr Phe Asp Ser Ser Arg Gly Lys Lys Arg Val Ser His Gln Tyr Arg Val Glu Ile Thr 545 550 560 Val Gly Ala Gln Glu Glu Asp Phe Gln Arg Arg Ile Val Tyr Ile Phe 565 570 575 Glu Arg Leu Phe Gly Val Thr Pro Ser Val Tyr Arg Lys Lys Asn Thr 580 585 590 Asn Ala Ile Thr Phe Lys Val Ala Lys Lys Glu Val Tyr Leu Arg Val 600 Arg Glu Ile Met Asp Gly Ile Glu Asn Leu His Ala Pro Ser Val Leu 610 620

Arg Gly Phe Phe Glu Gly Asp Gly Ser Val Asn Lys Val Arg Lys Thr 625 630 635 640 val val val Asn Gln Gly Thr Asn Asn Glu Trp Lys Ile Glu val val Ser Lys Leu Leu Asn Lys Leu Gly Ile Pro His Arg Arg Tyr Thr Tyr 660 665 670 Asp Tyr Thr Glu Arg Glu Lys Thr Met Thr His Ile Leu Glu Ile Ala Gly Arg Asp Gly Leu Ile Leu Phe Gln Thr Ile Val Gly Phe Ile 690 695 700 Ser Thr Glu Lys Asn Met Ala Leu Glu Glu Ala Ile Arg Asn Arg Glu Val Asn Arg Leu Glu Asn Asn Ala Phe Tyr Thr Leu Ala Asp Phe Thr 725 730 735 Ala Lys Thr Glu Tyr Tyr Lys Gly Lys Val Tyr Asp Leu Thr Leu Glu 740 745 750 Gly Thr Pro Tyr Tyr Phe Ala Asn Gly Ile Leu Thr His Asn Ser Leu 755 760 765 Tyr Pro Ser Ile Ile Ile Ser His Asn Val Ser Pro Asp Thr Leu Asn 770 780 Arg Glu Gly Cys Gly Glu Tyr Asp Glu Ala Pro Gln Val Gly His Arg 785 790 795 800 Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu Leu Gly Asp Leu 805 810 815 Leu Asp Glu Arg Gln Lys Val Lys Lys His Met Lys Ala Thr Val Asp 820 825 830 Pro Ile Glu Lys Lys Leu Leu Asp Tyr Arg Gln Arg Ala Ile Lys Ile 835 840 845 Leu Ala Asn Ser Phe Tyr Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp 850 860 Tyr Cys Lys Glu Cys Ala Glu Ser Val Thr Ala Trp Gly Arg Gln Tyr Page 121

- Ile Glu Thr Thr Met Arg Glu Ile Glu Glu Lys Phe Gly Phe Lys Val 885 890 895
- Leu Tyr Ala Asp Ser Val Thr Gly Asp Thr Glu Val Thr Ile Arg Arg 900 905 910
- Asn Gly Arg Ile Glu Phe Val Pro Ile Glu Lys Leu Phe Glu Arg Val 915 920 925
- Asp His Arg Val Gly Glu Lys Glu Tyr Cys Val Leu Gly Gly Val Glu 930 935 940
- Ala Leu Thr Leu Asp Asn Arg Gly Arg Leu Val Trp Lys Lys Val Pro 945 950 955 960
- Tyr Val Met Arg His Lys Thr Asp Lys Arg Ile Tyr Arg Val Trp Phe 965 970 975
- Thr Asn Ser Trp Tyr Leu Asp Val Thr Glu Asp His Ser Leu Ile Gly 985 990
- Tyr Leu Asn Thr Ser Lys Val Lys Pro Gly Lys Pro Leu Lys Glu Arg 995 1000 1005
- Leu Val Glu Val Lys Pro Glu Glu Leu Gly Gly Lys Val Lys Ser 1010 1015 1020
- Leu Ile Thr Pro Asn Arg Pro Ile Ala Arg Thr Ile Lys Ala Asn 1025 1030 1035
- Pro Ile Ala Val Lys Leu Trp Glu Leu Ile Gly Leu Leu Val Gly 1040 1045 1050
- Asp Gly Asn Trp Gly Gly Gln Ser Asn Trp Ala Lys Tyr Tyr Val 1055 1060 1065
- Gly Leu Ser Cys Gly Leu Asp Lys Ala Glu Ile Glu Arg Lys Val 1070 1080
- Leu Asn Pro Leu Arg Glu Ala Ser Val Ile Ser Asn Tyr Tyr Asp 1085 1090 1095
- Lys Ser Lys Lys Gly Asp Val Ser Ile Leu Ser Lys Trp Leu Ala 1100 1105 1110
- Gly Phe Met Val Lys Tyr Phe Lys Asp Glu Asn Gly Asn Lys Ala Page 122

Ile Pro Ser Phe Met Phe Asn Leu Pro Arg Glu Tyr Ile Glu Ala 1130 1140

1120

Phe Leu Arg Gly Leu Phe Ser Ala Asp Gly Thr Val Ser Leu Arg 1145 1150 1155

Arg Gly Ile Pro Glu Ile Arg Leu Thr Ser Val Asn Arg Glu Leu 1160 1165 1170

Ser Asp Ala Val Arg Lys Leu Leu Trp Leu Val Gly Val Ser Asn 1175 1180 1185

Ser Leu Phe Thr Glu Thr Lys Pro Asn Arg Tyr Leu Glu Lys Glu 1190 1195 1200

Ser Gly Thr His Ser Ile His Val Arg Ile Lys Asn Lys His Arg 1205 1210 1215

Phe Ala Asp Arg Ile Gly Phe Leu Ile Asp Arg Lys Ser Thr Lys 1220 1230

Leu Ser Glu Asn Leu Gly Gly His Thr Asn Lys Lys Arg Ala Tyr 1235 1240 1245

Lys Tyr Asp Phe Asp Leu Val Tyr Pro Arg Lys Ile Glu Glu Ile 1250 1260

Thr Tyr Asp Gly Tyr Val Tyr Asp Ile Glu Val Glu Gly Thr His 1265 1270 1275

Arg Phe Phe Ala Asn Gly Ile Leu Val His Asn Thr Asp Gly Phe 1280 1285 1290

Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys 1295 1300 1305

Ala Arg Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu 1310 1315 1320

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Arg Arg Gly Phe Phe Val 1325 1330 1335

Thr Lys Lys Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr 1340 1345 1350

sequence listing.txt Thr Arg Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Val Ala 1355 1360 Lys Glu Thr Gln Ala Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp val Glu Glu Ala Val Arg Ile Val Lys Glu Val Thr Glu Lys 1390 Leu Ser Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Glu Leu Lys Asp Tyr Lys Ala Thr Gly Pro His Val Ala Ile Ala Lys Arg Leu Ala Ala Arg Gly Ile Lys Val Arg 1440 Pro Gly Thr Val Ile Ser Tyr Ile Val Leu Lys Gly Ser Gly Arg 1445 1450 1455 Ile Gly Asp Arg Thr Ile Pro Phe Asp Glu Phe Asp Pro Thr Lys 1470 1460 1465 His Arg Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Val Leu Pro 1475 1480 1485 Ala Val Glu Arg Ile Leu Lys Ala Phe Gly Tyr Lys Lys Glu Asp 1490 1495 1500 Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Gly Ala Trp Leu 1505 1510 1515 Lys Met Gly Lys Lys 1520 95 <210> 586 <211> <212> PRT Methanobacterium thermoautotrophicum <213> <400> Met Glu Asp Tyr Arg Met Val Leu Leu Asp Ile Asp Tyr Val Thr Val Asp Glu Val Pro Val Ile Arg Leu Phe Gly Lys Asp Lys Ser Gly Gly 20 25 30

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Lys Gly Thr Val His Val Asp Leu Tyr Pro Val Met Arg Arg Tyr Met 290 295 300

Asn Leu Asp Arg Tyr Thr Leu Glu Arg Val Tyr Gln Glu Leu Phe Gly 305 310 315

Glu Glu Lys Ile Asp Leu Pro Gly Asp Arg Leu Trp Glu Tyr Trp Asp 325 330 335

Arg Asp Glu Leu Arg Asp Glu Leu Phe Arg Tyr Ser Leu Asp Asp Val

Val Ala Thr His Arg Ile Ala Glu Lys Ile Leu Pro Leu Asn Leu Glu 355 360 365

Leu Thr Arg Leu Val Gly Gln Pro Leu Phe Asp Ile Ser Arg Met Ala 370 375 380

Thr Gly Gln Gln Ala Glu Trp Phe Leu Val Arg Lys Ala Tyr Gln Tyr 385 390 395 400

Gly Glu Leu Val Pro Asn Lys Pro Ser Gln Ser Asp Phe Ser Ser Arg 405 410 415

Arg Gly Arg Arg Ala Val Gly Gly Tyr Val Lys Glu Pro Glu Lys Gly 420 425 430

Leu His Glu Asn Ile Val Gln Phe Asp Phe Arg Ser Leu Tyr Pro Ser

Ile Ile Ser Lys Asn Ile Ser Pro Asp Thr Leu Thr Asp Asp Glu 450 455 460

Glu Ser Glu Cys Tyr Val Ala Pro Glu Tyr Gly Tyr Arg Phe Arg Lys 465 470 475 480

Ser Pro Arg Gly Phe Val Pro Ser Val Ile Gly Glu Ile Leu Ser Glu 485 490 495

Arg Val Arg Ile Lys Glu Glu Met Lys Gly Ser Asp Asp Pro Met Glu 500 510

Arg Lys Ile Leu Asn Val Gln Gln Glu Ala Leu Lys Arg Leu Ala Asn 515 520 525

Thr Met Tyr Gly Val Tyr Gly Tyr Ser Arg Phe Arg Trp Tyr Ser Met 530 540 Page 126

Glu Cys Ala Glu Ala Ile Thr Ala Trp Gly Arg Asp Tyr Ile Lys Lys 545 550 555 560

Thr Ile Lys Thr Ala Glu Glu Phe Gly Phe His Thr Val Tyr Ala Asp 565 570 575

Thr Asp Gly Phe Tyr Ala Thr Tyr Arg Gly 580 585

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<400> 96

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Asn Ser Ile Leu Lys Asp Arg Asp Phe Lys Pro Tyr Phe Tyr Val Glu 35 40 45

Leu His Lys Glu Lys Val Glu Asn Glu Asp Ile Glu Lys Ile Lys Glu 50 55 60

Phe Leu Leu Lys Asn Asp Leu Leu Lys Phe Val Glu Asn Ile Glu Val 65 70 75 80

Val Lys Lys Ile Ile Leu Arg Lys Glu Lys Glu Val Ile Lys Ile Ile 85 90 95

Ala Thr His Pro Gln Lys Val Pro Lys Leu Arg Lys Ile Lys Glu Cys 100 105 110

Glu Ile Val Lys Glu Ile Tyr Glu His Asp Ile Pro Phe Ala Lys Arg

Tyr Leu Ile Asp Asn Glu Ile Ile Pro Met Thr Tyr Trp Asp Phe Glu 130 135 140

Asn Lys Lys Pro Val Ser Ile Glu Ile Pro Lys Leu Lys Ser Val Ala 145 150 155 160

Phe Asp Met Glu Val Tyr Asn Arg Asp Thr Glu Pro Asn Pro Glu Arg 165 170 175 Page 127

Asp Pro Ile Leu Met Ala Ser Phe Trp Asp Glu Asn Gly Gly Lys Val 180 185 190 Ile Thr Tyr Lys Glu Phe Asn His Pro Asn Ile Glu Val Val Lys Asn 195 200 205 Glu Lys Glu Leu Ile Lys Lys Ile Ile Glu Thr Leu Lys Glu Tyr Asp 210 215 220 Val Ile Tyr Thr Tyr Asn Gly Asp Asn Phe Asp Phe Pro Tyr Leu Lys 225 230 235 240 Ala Arg Ala Lys Ile Tyr Gly Ile Asp Ile Asn Leu Gly Lys Asp Gly 245 250 255 Glu Glu Leu Lys Ile Lys Arg Gly Gly Met Glu Tyr Arg Ser Tyr Ile 260 265 270 Pro Gly Arg Val His Ile Asp Leu Tyr Pro Ile Ser Arg Arg Leu Leu 275 280 285 Lys Leu Thr Lys Tyr Thr Leu Glu Asp Val Val Tyr Asn Leu Phe Gly Ile Glu Lys Leu Lys Ile Pro His Thr Lys Ile Val Asp Tyr Trp Ala 305 310 315 320 Asn Asn Asp Lys Thr Leu Ile Glu Tyr Ser Leu Gln Asp Ala Lys Tyr 325 330 335 Thr Tyr Lys Ile Gly Lys Tyr Phe Phe Pro Leu Glu Val Met Phe Ser Arg Ile Val Asn Gln Thr Pro Phe Glu Ile Thr Arg Met Ser Ser Gly 355 Gln Met Val Glu Tyr Leu Leu Met Lys Arg Ala Phe Lys Glu Asn Met Ile Val Pro Asn Lys Pro Asp Glu Glu Glu Tyr Arg Arg Arg Val Leu 385 390 395 400 Thr Thr Tyr Glu Gly Gly Tyr Val Lys Glu Pro Glu Lys Gly Met Phe 405 410 415 Glu Asp Ile Ile Ser Met Asp Phe Arg Cys His Pro Lys Gly Thr Lys Page 128

Val Val Lys Gly Lys Gly Ile Val Asn Ile Glu Asp Val Lys Glu 435 440 445

Gly Asn Tyr Val Leu Gly Ile Asp Gly Trp Gln Lys Val Lys Lys Val 450 460

Trp Lys Tyr Glu Tyr Glu Gly Glu Leu Ile Asn Val Asn Gly Leu Lys 465 470 480

Cys Thr Pro Asn His Lys Ile Pro Leu Arg Tyr Lys Ile Lys His Lys 485 490 495

Lys Ile Asn Lys Asn Asp Tyr Leu Val Arg Asp Ile Tyr Ala Lys Ser 500 505 510

Leu Leu Thr Lys Phe Lys Gly Glu Gly Lys Leu Ile Leu Cys Lys Asp 515 520 525

Phe Glu Thr Ile Gly Asn Tyr Glu Lys Tyr Ile Asn Asp Met Asp Glu 530 540

Asp Phe Ile Leu Lys Ser Glu Leu Ile Gly Ile Leu Leu Ala Glu Gly 545 550 555 560

His Leu Leu Arg Arg Asp Ile Glu Tyr Phe Asp Sér Ser Arg Gly Lys 565 570 575

Lys Arg Ile Ser His Gln Tyr Arg Val Glu Ile Thr Val Asn Glu Asp 580 585 590

Glu Lys Asp Phe Ile Glu Lys Ile Lys Tyr Ile Phe Lys Lys Leu Phe 595 600 605

Asn Tyr Glu Leu Tyr Val Arg Arg Lys Lys Gly Thr Lys Ala Ile Thr 610 620

Leu Gly Cys Ala Lys Lys Asp Ile Tyr Leu Lys Ile Glu Glu Ile Leu 625 630 635 640

Lys Asn Lys Glu Lys Tyr Leu Pro Asn Ala Ile Leu Arg Gly Phe Phe 645 650 655

Glu Gly Asp Gly Tyr Val Asn Thr Val Arg Arg Ala Val Val Asn 660 665 670

sequence listing.txt
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- Thr Lys Asn Leu Lys Thr Phe Ser Phe Asp Lys Ile Thr Lys Lys Cys 930 935 940
- Glu Ile Lys Lys Val Lys Ala Leu Ile Arg His Pro Tyr Phe Gly Lys 945 950 955 960
- Ala Tyr Lys Ile Lys Leu Arg Ser Gly Arg Thr Ile Lys Val Thr Arg 965 970 975
- Gly His Ser Leu Phe Lys Tyr Glu Asn Gly Lys Ile Val Glu Val Lys 980 985 990
- Gly Asp Asp Val Arg Phe Gly Asp Leu Ile Val Val Pro Lys Lys Leu 995 1000 1005
- Thr Cys Val Asp Lys Glu Val Val Ile Asn Ile Pro Lys Arg Leu 1010 1015 1020
- Ile Asn Ala Asp Glu Glu Glu Ile Lys Asp Leu Val Ile Thr Lys 1025 1030 1035
- His Lys Asp Lys Ala Phe Phe Val Lys Leu Lys Lys Thr Leu Glu 1040 1045 1050
- Asp Ile Glu Asn Asn Lys Leu Lys Val Ile Phe Asp Asp Cys Ile 1055 1060 1065
- Leu Tyr Leu Lys Glu Leu Gly Leu Ile Asp Tyr Asn Ile Ile Lys 1070 1080
- Lys Ile Asn Lys Val Asp Ile Lys Ile Leu Asp Glu Glu Lys Phe 1085 1090 1095
- Lys Ala Tyr Lys Lys Tyr Phe Asp Thr Val Ile Glu His Gly Asn 1100 1105 1110
- Phe Lys Lys Gly Arg Cys Asn Ile Gln Tyr Ile Lys Ile Lys Asp 1115 1120 1125
- Tyr Ile Ala Asn Ile Pro Asp Lys Glu Phe Glu Asp Cys Glu Ile 1130 1135 1140
- Gly Ala Tyr Ser Gly Lys Ile Asn Ala Leu Leu Lys Leu Asp Glu 1145 1150 1155
- Lys Leu Ala Lys Phe Leu Gly Phe Phe Val Thr Arg Gly Arg Leu 1160 1170 Page 131

Lys Lys Gln Lys Leu Lys Gly Glu Thr Val Tyr Glu Ile Ser Val 1175 1180 1185

Tyr Lys Ser Leu Pro Glu Tyr Gln Lys Glu Ile Ala Glu Thr Phe 1190 1195 1200

Lys Glu Val Phe Gly Ala Gly Ser Met Val Lys Asp Lys Val Thr 1205 1210 1215

Met Asp Asn Lys Ile Val Tyr Leu Val Leu Lys Tyr Ile Phe Lys 1220 1230

Cys Gly Asp Lys Asp Lys Lys His Ile Pro Glu Glu Leu Phe Leu 1235 1240 1245

Ala Ser Glu Ser Val Ile Lys Ser Phe Leu Asp Gly Phe Leu Lys 1250 1260

Ala Lys Lys Asn Ser His Lys Gly Thr Ser Thr Phe Met Ala Lys 1265 1270 1275

Asp Glu Lys Tyr Leu Asn Gln Leu Met Ile Leu Phe Asn Leu Val 1280 1285 1290

Gly Ile Pro Thr Arg Phe Thr Pro Val Lys Asn Lys Gly Tyr Lys 1295 1300 1305

Leu Thr Leu Asn Pro Lys Tyr Gly Thr Val Lys Asp Leu Met Leu 1310 1315 1320

Asp Glu Val Lys Glu Ile Glu Ala Phe Glu Tyr Ser Gly Tyr Val 1325 1330 1335

Tyr Asp Leu Ser Val Glu Asp Asn Glu Asn Phe Leu Val Asn Asn 1340 1345 1350

Ile Tyr Ala His Asn Ser Val Tyr Gly Tyr Leu Ala Phe Pro Arg 1355 1360 1365

Ala Arg Phe Tyr Ser Arg Glu Cys Ala Glu Ile Val Thr Tyr Leu 1370 1375 1380

Gly Arg Lys Tyr Ile Leu Glu Thr Val Lys Glu Ala Glu Lys Phe 1385 1390 1395

Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly Phe Tyr Ala Ile Page 132

1405 1410 1400 Trp Lys Glu Lys Ile Ser Lys Glu Glu Leu Ile Lys Lys Ala Met 1415 1420 Glu Phe Val Glu Tyr Ile Asn Ser Lys Leu Pro Gly Thr Met Glu 1430 Leu Glu Phe Glu Gly Tyr Phe Lys Arg Gly Ile Phe Val Thr Lys 1445 1450 Lys Arg Tyr Ala Leu Ile Asp Glu Asn Gly Arg Val Thr Val Lys 1460 1465 1470 Gly Leu Glu Phe Val Arg Arg Asp Trp Ser Asn Ile Ala Lys Ile Thr Gln Arg Arg Val Leu Glu Ala Leu Leu Val Glu Gly Ser Ile 1495 Glu Lys Ala Lys Lys Ile Ile Gln Asp Val Ile Lys Asp Leu Arg 1505 1510 1515 Glu Lys Lys Ile Lys Lys Glu Asp Leu Ile Ile Tyr Thr Gln Leu 1520 1530

Thr Lys Asp Pro Lys Glu Tyr Lys Thr Thr Ala Pro His Val Glu

Ile Ala Lys Lys Leu Met Arg Glu Gly Lys Arg Ile Lys Val Gly 1550 1560

Asp Ile Ile Gly Tyr Ile Ile Val Lys Gly Thr Lys Ser Ile Ser 1565 1570 1575

Glu Arg Ala Lys Leu Pro Glu Glu Val Asp Ile Asp Asp Ile Asp

Val Asn Tyr Tyr Ile Asp Asn Gln Ile Leu Pro Pro Val Leu Arg 1600

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Gly Ala Gln Leu Thr Leu Asp Lys Phe Phe Lys 1625

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Pyrodictium occultum

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Lys Arg Val Val Leu Leu Asp His Arg Phe Arg Pro Tyr Phe Tyr Ala 35 40 45

Leu Ile Ala Arg Gly Tyr Glu Asp Met Val Glu Glu Ile Ala Ala Ser 50 55 60

Ile Arg Arg Leu Ser Val Val Lys Ser Pro Ile Ile Asp Ala Lys Pro 65 70 75 80

Leu Asp Lys Arg Tyr Phe Gly Arg Pro Arg Lys Ala Val Lys Ile Thr 85 90 95

Thr Met Ile Pro Glu Ser Val Arg His Tyr Arg Glu Ala Val Lys Lys 100 105 110

Tyr Leu Ile Asp Lys Arg Leu Tyr Pro Phe Thr Val Tyr Arg Ile 130 135 140

Pro Val Glu Asp Ala Gly Arg Asn Pro Gly Phe Arg Val Asp Arg Val 145 150 155 160

Tyr Lys Val Ala Gly Asp Pro Glu Pro Leu Ala Asp Ile Thr Arg Ile 165 170 175

Asp Leu Pro Pro Met Arg Leu Val Ala Phe Asp Ile Glu Val Tyr Ser

Arg Arg Gly Ser Pro Asn Pro Ala Arg Asp Pro Val Ile Ile Val Ser 195 200 205

Leu Arg Asp Ser Glu Gly Lys Glu Arg Leu Ile Glu Ala Glu Gly His 210 215 220

sequence listing.txt
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225 230 235 240 Asp Pro Asp Ile Ile Val Gly Tyr Asn Ser Asn His Phe Asp Trp Pro 245 250 255 Tyr Leu Met Glu Arg Ala Arg Arg Leu Gly Ile Lys Leu Asp Val Thr 260 265 270 Arg Arg Val Gly Ala Glu Pro Thr Thr Ser Val Tyr Gly His Val Ser 275 280 285 Val Gln Gly Arg Leu Asn Val Asp Leu Tyr Asp Tyr Ala Glu Glu Met 290 295 300 Pro Glu Ile Lys Met Lys Thr Leu Glu Glu Val Ala Glu Tyr Leu Gly 305 310 315 Val Met Lys Lys Ser Glu Arg Val Ile Ile Glu Trp Trp Arg Ile Pro 325 330 335 Glu Tyr Trp Asp Asp Glu Lys Lys Arg Gln Leu Leu Glu Arg Tyr Ala 340 345 350 Leu Asp Asp Val Arg Ala Thr Tyr Gly Leu Ala Glu Lys Met Leu Pro 355 360 365 Phe Ala Ile Gln Leu Ser Thr Val Thr Gly Val Pro Leu Asp Gln Val 370 375 380 Gly Ala Met Gly Val Gly Phe Arg Leu Glu Trp Tyr Leu Met Arg Ala 385 390 395 400 Ala Tyr Asp Met Asn Glu Leu Val Pro Asn Arg Val Glu Arg Arg Gly
405
410
415 Glu Ser Tyr Lys Gly Ala Val Val Leu Lys Pro Leu Lys Gly Val His 420 425 430 Glu Asn Val Val Leu Asp Phe Ser Ser Met Tyr Pro Ser Ile Met Ile Lys Tyr Asn Val Gly Pro Asp Thr Ile Val Asp Asp Pro Ser Glu 450 455 460 Cys Pro Lys Tyr Gly Gly Cys Tyr Val Ala Pro Glu Val Gly His Arg
465 470 475 480

Phe Arg Arg Ser Pro Pro Gly Phe Phe Lys Thr Val Leu Glu Asn Leu Leu Lys Leu Arg Arg Gln Val Lys Glu Lys Met Lys Glu Phe Pro Pro 500 505 510 Asp Ser Pro Glu Tyr Arg Leu Tyr Asp Glu Arg Gln Lys Ala Leu Lys 515 520 525 Val Leu Ala Asn Ala Ser Tyr Gly Tyr Met Gly Trp Ser His Ala Arg 530 540 Trp Tyr Cys Lys Arg Cys Ala Glu Ala Val Thr Ala Trp Gly Arg Asn 545 550 555 Leu Ile Leu Thr Ala Ile Glu Tyr Ala Arg Lys Leu Gly Leu Lys Val 565 570 575 Ile Tyr Gly Asp Thr Asp Ser Leu Phe Val Val Tyr Asp Lys Glu Lys 580 585 590 Val Glu Lys Leu Ile Glu Phe Val Glu Lys Glu Leu Gly Phe Glu Ile 595 600 605 Lys Ile Asp Lys Ile Tyr Lys Lys Val Phe Phe Thr Glu Ala Lys Lys 610 615 620 Arg Tyr Val Gly Leu Leu Glu Asp Gly Arg Ile Asp Ile Val Gly Phe 625 630 635 Glu Ala Val Arg Gly Asp Trp Cys Glu Leu Ala Lys Glu Val Gln Glu 645 650 655 Lys Ala Ala Glu Ile Val Leu Asn Thr Gly Asn Val Asp Lys Ala Ile 660 665, 670 Ser Tyr Ile Arg Glu Val Ile Lys Gln Leu Arg Glu Gly Lys Val Pro 675 680 685 Ile Thr Lys Leu Ile Ile Trp Lys Thr Leu Ser Lys Arg Ile Glu Glu 690 695 700 Tyr Glu His Asp Ala Pro His Val Met Ala Ala Arg Arg Met Lys Glu 705 710 715 720 Ala Gly Tyr Glu Val Ser Pro Gly Asp Lys Val Gly Tyr Val Ile Val 725 730 735 Page 136

Lys Gly Ser Gly Ser Val Ser Ser Arg Ala Tyr Pro Tyr Phe Met Val 740 745 750

Asp Pro Ser Thr Ile Asp Val Asn Tyr Tyr Ile Asp His Gln Ile Val 755 760 765

Pro Ala Ala Leu Arg Ile Leu Ser Tyr Phe Gly Val Thr Glu Lys Gln 770 775 780

Leu Lys Ala Ala Ala Thr Val Gln Arg Ser Leu Phe Asp Phe Phe Ala 785 790 795 800

Ser Lys Lys

<210> 98

<211> 784

<212> PRT

<213> Aeropyrum pernix

<400> 98

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Gly Ser Arg Val Val Val Phe Tyr Gly Glu Phe Arg Pro Tyr Phe Tyr 20 25 30

Val Leu Pro Asp Gly Ser Val Gly Leu Asp Gln Leu Ala Ala Met Ile 35 40 45

Arg Arg Leu Ser Arg Pro Ser Ser Pro Ile Leu Ser Val Glu Arg Val 50 60

Arg Arg Arg Phe Ile Gly Arg Glu Val Glu Ala Leu Lys Val Thr Thr 65 70 75 80

Leu Val Pro Ala Ser Val Arg Glu Tyr Arg Glu Ala Val Arg Arg Leu 85 90 95

Gly Gly Val Arg Asp Val Leu Glu Ala Asp Ile Pro Phe Ala Leu Arg 100 105 110

Phe Ile Ile Asp Phe Asn Leu Tyr Pro Met Arg Trp Tyr Val Ala Glu 115 120 125

Val Arg Glu Val Ala Val Pro His Gly Tyr Ser Val Asp Arg Ala Tyr 130 135 140 Page 137

Thr Leu Ser Gly Asp Ile Arg Glu Asp Glu Thr Arg Ile Gln Glu Asp 145 150 155 160 Pro Leu Lys Gly Leu Arg Val Met Ala Phe Asp Ile Glu Val Tyr Ser 165 170 175 Lys Met Arg Thr Pro Asp Pro Lys Lys Asp Pro Val Ile Met Ile Gly $180 \hspace{1cm} 185 \hspace{1cm} 190$ Leu Gln Gln Ala Gly Gly Glu Ile Glu Ile Leu Glu Ala Glu Asp Arg Ser Asp Lys Lys Val Ile Ala Gly Phe Val Glu Arg Val Lys Ser Ile 210 215 220 Asp Pro Asp Val Ile Val Gly Tyr Asn Gln Asn Arg Phe Asp Trp Pro 225 230 235 240 Tyr Leu Val Glu Arg Ala Arg Val Leu Gly Val Lys Leu Ala Val Gly 245 250 255 Arg Arg Ser Val Glu Pro Gln Pro Gly Leu Tyr Gly His Tyr Ser Val 260 265 270 Ser Gly Arg Leu Asn Val Asp Leu Leu Asp Phe Ala Glu Glu Leu His 275 280 285 Glu Val Lys Val Lys Thr Leu Glu Glu Val Ala Asp Tyr Leu Gly Val 290 295 300 Val Lys Ile Gly Glu Arg Val Thr Leu Glu Trp Trp Gln Ile Gly Glu 305 310 315 320 Tyr Trp Asp Asp Pro Ser Lys Arg Glu Ile Leu Arg Lys Tyr Leu Arg Asp Asp Val Arg Ser Thr Met Gly Leu Ala Glu Lys Phe Leu Pro Phe 340 345 350 Gly Ala Glu Leu Ser Gln Val Ser Gly Leu Pro Leu Asp Gln Val Met 355 360 365 Ala Ala Ser Val Gly Phe Arg Leu Glu Trp Arg Leu Ile Arg Glu Ala 370 375 380 Ala Lys Leu Gly Glu Leu Val Pro Asn Arg Val Glu Arg Ser Glu Gly Page 138

Arg Tyr Ala Gly Ala Ile Val Leu Arg Pro Lys Pro Gly Val His Glu 405 410 415

Asp Ile Ala Val Leu Asp Phe Ala Ser Met Tyr Pro Asn Ile Met Val 420 425 430

Lys Tyr Asn Val Gly Pro Asp Thr Leu Val Arg Pro Gly Glu Glu Tyr 435 440 445

Gly Glu Glu Val Tyr Thr Ala Pro Glu Val Gly His Lys Phe Arg 450 455 460

Lys Ser Pro Pro Gly Phe Phe Lys Lys Ile Leu Glu Arg Phe Leu Ser 465 470 475 480

Trp Arg Arg Gln Ile Arg Ser Glu Met Lys Lys His Pro Pro Asp Ser 485 490 495

Pro Glu Tyr Lys Leu Leu Asp Glu Arg Gln Lys Ala Ile Lys Leu Leu 500 510

Ala Asn Ala Ser Tyr Gly Tyr Met Gly Trp Pro His Ala Arg Trp Tyr 515 520 525

Cys Arg Glu Cys Ala Glu Ala Val Thr Ala Trp Gly Arg Ser Ile Ile 530 540

Arg Thr Ala Ile Arg Lys Ala Gly Glu Leu Gly Leu Glu Val Ile Tyr 545 550 555

Gly Asp Thr Asp Ser Leu Phe Val Lys Asn Asp Pro Glu Lys Val Glu 565 570 575

Arg Leu Ile Arg Phe Val Glu Glu Glu Leu Gly Phe Asp Ile Lys Val 580 585 590

Asp Lys Val Tyr Arg Arg Val Phe Phe Thr Glu Ala Lys Lys Arg Tyr 595 600 605

Val Gly Leu Thr Val Asp Gly Lys Ile Asp Val Val Gly Phe Glu Ala 610 615 620

Val Arg Gly Asp Trp Ser Glu Leu Ala Lys Glu Thr Gln Phe Lys Val 625 630 635 640 sequence listing.txt
Ala Glu Ile Val Leu Lys Thr Gly Ser Val Asp Glu Ala Val Asp Tyr
645 650 655 Val Arg Asn Ile Ile Glu Lys Leu Arg Arg Gly Gln Val Asp Met Arg 660 665 670 Lys Leu Val Ile Trp Lys Thr Leu Thr Arg Pro Pro Ser Met Tyr Glu 675 680 685 Ala Arg Gln Pro His Val Thr Ala Ala Leu Leu Met Glu Arg Ala Gly 690 700 Ile Lys Val Glu Pro Gly Ala Lys Ile Gly Tyr Val Val Thr Lys Gly 705 710 715 720 Ser Gly Pro Leu Tyr Thr Arg Ala Lys Pro Tyr Phe Met Ala Ser Lys 725 730 735 Glu Glu Val Asp Val Glu Tyr Tyr Val Asp Lys Gln Val Val Pro Ala 740 745 750 Ala Leu Arg Ile Leu Gln Tyr Phe Gly Val Thr Glu Lys Arg Leu Lys 755 760 765 Gly Gly Gly Arg Gln Ser Thr Leu Leu Asp Phe Met Arg Arg Gly Lys 770 780 <210> <211> 781 <212> PRT Archaeoglobus fulgidus <400> Met Glu Arg Val Glu Gly Trp Leu Ile Asp Ala Asp Tyr Glu Thr Ile 1 5 10 15 Gly Gly Lys Ala Val Val Arg Leu Trp Cys Lys Asp Asp Gln Gly Ile 20 25 30 Phe Val Ala Tyr Asp Tyr Asn Phe Asp Pro Tyr Phe Tyr Val Ile Gly
35 40 45 Val Asp Glu Asp Ile Leu Lys Asn Ala Ala Thr Ser Thr Arg Arg Glu 50 60 Val Ile Lys Leu Lys Ser Phe Glu Lys Ala Gln Leu Lys Thr Leu Gly 65 70 75 80 sequence listing.txt Arg Glu Val Glu Gly Tyr Ile Val Tyr Ala His His Pro Gln His Val 85 90 95 Pro Lys Leu Arg Asp Tyr Leu Ser Gln Phe Gly Asp Val Arg Glu Ala 100 105 110 Asp Ile Pro Phe Ala Tyr Arg Tyr Leu Ile Asp Lys Asp Leu Ala Cys 115 120 125 Met Asp Gly Ile Ala Ile Glu Gly Glu Lys Gln Gly Gly Val Ile Arg 130 135 140 Ser Tyr Lys Ile Glu Lys Val Glu Arg Ile Pro Arg Met Glu Phe Pro 145 150 155 160 Glu Leu Lys Met Leu Val Phe Asp Cys Glu Met Leu Ser Ser Phe Gly Met Pro Glu Pro Glu Lys Asp Pro Ile Ile Val Ile Ser Val Lys Thr Asn Asp Asp Glu Ile Ile Leu Thr Gly Asp Glu Arg Lys Ile Ile 195 200 205 Ser Asp Phe Val Lys Leu Ile Lys Ser Tyr Asp Pro Asp Ile Ile Val 210 215 220 Gly Tyr Asn Gln Asp Ala Phe Asp Trp Pro Tyr Leu Arg Lys Arg Ala 225 230 235 240 Glu Arg Trp Asn Ile Pro Leu Asp Val Gly Arg Asp Gly Ser Asn Val 245 250 255 Val Phe Arg Gly Gly Arg Pro Lys Ile Thr Gly Arg Leu Asn Val Asp 260 265 270 Leu Tyr Asp Ile Ala Met Arg Ile Ser Asp Ile Lys Ile Lys Lys Leu 275 280 285 Glu Asn Val Ala Glu Phe Leu Gly Thr Lys Ile Glu Ile Ala Asp Ile 300 Glu Ala Lys Asp Ile Tyr Arg Tyr Trp Ser Arg Gly Glu Lys Glu Lys 305 310 315 320Val Leu Asn Tyr Ala Arg Gln Asp Ala Ile Asn Thr Tyr Leu Ile Ala 325 330 335

Lys Glu Leu Leu Pro Met His Tyr Glu Leu Ser Lys Met Ile Arg Leu 350 Pro Val Asp Asp Val Thr Arg Met Gly Arg Gly Lys Gln Val Asp Trp 355 360 365 Leu Leu Ser Glu Ala Lys Lys Ile Gly Glu Ile Ala Pro Asn Pro 370 375 380 Pro Glu His Ala Glu Ser Tyr Glu Gly Ala Phe Val Leu Glu Pro Glu Arg Gly Leu His Glu Asn Val Ala Cys Leu Asp Phe Ala Ser Met Tyr Pro Ser Ile Met Ile Ala Phe Asn Ile Ser Pro Asp Thr Tyr Gly Cys 425 430Asp Asp Cys Tyr Glu Ala Pro Glu Val Gly His Lys Phe Arg Lys 435 440 445 Ser Pro Asp Gly Phe Phe Lys Arg Ile Leu Arg Met Leu Ile Glu Lys 450 455 460 Arg Arg Glu Leu Lys Val Glu Leu Lys Asn Leu Ser Pro Glu Ser Ser 465 470 475 480 Glu Tyr Lys Leu Leu Asp Ile Lys Gln Gln Thr Leu Lys Val Leu Thr Asn Ser Phe Tyr Gly Tyr Met Gly Trp Asn Leu Ala Arg Trp Tyr Cys 500 505 510His Pro Cys Ala Glu Ala Thr Thr Ala Trp Gly Arg His Phe Ile Arg 515 520 525 Thr Ser Ala Lys Ile Ala Glu Ser Met Gly Phe Lys Val Leu Tyr Gly Asp Thr Asp Ser Ile Phe Val Thr Lys Ala Gly Met Thr Lys Glu Asp 545 550 555 560 Val Asp Arg Leu Ile Asp Lys Leu His Glu Glu Leu Pro Ile Gln Ile 565 570 575 Glu Val Asp Glu Tyr Tyr Ser Ala Ile Phe Phe Val Glu Lys Lys Arg 585 Page 142

Tyr Ala Gly Leu Thr Glu Asp Gly Arg Leu Val Val Lys Gly Leu Glu 595 600 605

Val Arg Arg Gly Asp Trp Cys Glu Leu Ala Lys Lys Val Gln Arg Glu 610 620

Val Ile Glu Val Ile Leu Lys Glu Lys Asn Pro Glu Lys Ala Leu Ser 625 630 635 640

Leu Val Lys Asp Val Ile Leu Arg Ile Lys Glu Gly Lys Val Ser Leu 655 655

Glu Glu Val Val Ile Tyr Lys Gly Leu Thr Lys Lys Pro Ser Lys Tyr 660 665 670

Glu Ser Met Gln Ala His Val Lys Ala Ala Leu Lys Ala Arg Glu Met 675 680 685

Gly Ile Ile Tyr Pro Val Ser Ser Lys Ile Gly Tyr Val Ile Val Lys 690 695 700

Gly Ser Gly Asn Ile Gly Asp Arg Ala Tyr Pro Ile Asp Leu Ile Glu 705 710 715 720

Asp Phe Asp Gly Glu Asn Leu Arg Ile Lys Thr Lys Ser Gly Ile Glu 725 730 735

Ile Lys Lys Leu Asp Lys Asp Tyr Tyr Ile Asp Asn Gln Ile Ile Pro
740 745 750

Ser Val Leu Arg Ile Leu Glu Arg Phe Gly Tyr Thr Glu Ala Ser Leu 755 760 765

Lys Gly Ser Ser Gln Met Ser Leu Asp Ser Phe Phe Ser 770 780

<400> 100

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Arg Val Phe Lys Lys Glu Lys Gly Glu Phe Lys Ile Asp Tyr Asp Arg 20 25 30 Page 143

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<211> 773

<212> PRT

<213> Desulfurococcus saccharovorans

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100 105 110 Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Arg Gly Leu Ile Pro 115 120 125Met Glu Gly Asp Glu Glu Leu Arg Met Leu Ala Phe Asp Ile Glu Thr 130 135 140 Leu Tyr His Glu Gly Glu Glu Phe Gly Glu Gly Pro Ile Leu Met Ile 145 150 155 160 Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Ile 165 170 175 Asp Leu Pro Tyr Val Glu Ser Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190 Arg Phe Leu Lys Val Ile Gln Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205 Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Ser Glu 210 220 Met Leu Gly Val Lys Phe Ile Leu Gly Arg Asp Gly Ser Glu Pro Lys 225 230 235 240 Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 265 270 Tyr Thr Leu Glu Thr Val Tyr Glu Pro Val Phe Gly Gln Pro Lys Glu

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Lys Val Tyr Ala Glu Glu Ile Ala Arg Ala Trp Glu Ser Gly Glu Gly 290 295 300 Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr 305 310 315 320 Glu Leu Gly Lys Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335 Val Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Asp Val Ala 355 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Thr Glu Ser Tyr 370 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn Ile 385 390 395 400 Val Tyr Leu Asp Tyr Lys Ser Leu Tyr Pro Ser Ile Ile Ile Thr His 405 410 415 Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Glu Tyr Asp 420 425 430 Val Ala Pro Gln Val Gly His Arg Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445 Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Val Lys 450 455 460 Lys Lys Met Lys Ala Thr Val Asp Pro Ile Glu Arg Lys Leu Leu Asp 465 470 475 480 Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr 485 490 495 Tyr Ala Tyr Ala Asn Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser 500 510

Val Thr Ala Trp Gly Arg Gln Tyr Ile Glu Thr Thr Met Arg Glu Ile 515 520 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Phe 530 540 Phe Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Asn Lys Ala 545 550 555 560 Lys Glu Phe Leu Asn Tyr Ile Asn Pro Arg Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Arg Arg Gly Phe Phe Val Thr Lys Lys 580 585 590 Lys Tyr Ala Val Ile Asp Glu Glu Asp Lys Ile Thr Thr Arg Gly Leu 595 605 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620 Arg Val Leu Glu Ala Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 635 Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Arg His Glu Val Pro 645 650 655 Pro Glu Lys Leu Val Ile Tyr Glu Gln Ile Thr Arg Asp Leu Arg Ser Tyr Arg Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 680 685 Arg Gly Ile Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700 Lys Gly Pro Gly Arg Val Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe 705 710 715 720 Asp Pro Ala Lys His Arg Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln 725 730 735 Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys 740 745 750 Glu Asp Leu Arg Tyr Gln Lys Thr Lys Gln Ala Gly Leu Gly Ala Trp 755 760 765 Leu Lys Pro Lys Thr 770

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<213> Thermococcus sp.

<400> 101

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Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile 35 40 45

Glu Asp Val Lys Lys Val Thr Ala Lys Arg His Gly Thr Val Val Lys 50 60

Val Lys Arg Ala Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro Ile 65 70 75

Glu Val Trp Lys Leu Tyr Phe Asn His Pro Gln Asp Val Pro Ala Ile 85 90 95

Arg Asp Arg Ile Arg Ala His Pro Ala Val Val Asp Ile Tyr Glu Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro 115 120 125

Met Glu Gly Asp Glu Glu Leu Thr Met Leu Ala Phe Asp Ile Glu Thr 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Gly Thr Gly Pro Ile Leu Met Ile 145 150 155 160

Ser Tyr Ala Asp Gly Ser Glu Ala Arg Val Ile Thr Trp Lys Lys Ile 165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Lys Glu Met Ile Lys 180 185 190

Arg Phe Leu Arg Val Val Arg Glu Lys Asp Pro Asp Val Leu Ile Thr 195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu 210 215 220

Glu Leu Gly Ile Lys Phe Thr Leu Gly Arg Asp Gly Ser Glu Pro Lys 235 240 Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile 245 250 255 His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr 260 265 270 Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Phe Gly Lys Pro Lys Glu 275 280 285 Lys Val Tyr Ala Glu Glu Ile Ala Gln Ala Trp Glu Ser Gly Glu Gly 290 295 300 Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr 305 310 315 Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu 325 330 335 Ile Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu 340 345 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Lys Arg Asn Glu Leu Ala 355 . 360 365 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr 370 375 380 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile 385 390 395 400 Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Lys Glu Tyr Asp 420 430 Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe 435 440 445 Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Ile Lys 450 455 460 Arg Lys Met Lys Ala Thr Val Asp Pro Leu Glu Lys Lys Leu Leu Asp 470 Page 148

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Phe Tyr Gly Tyr 485 490 495 Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser 500 505 510 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu 515 525 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu 530 540 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala 545 550 555 560 Lys Glu Phe Leu Lys Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu 565 570 575 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys 580 585 590 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala 610 620 Arg Val Leu Glu Ala Ile Leu Lys His Gly Asp Val Glu Glu Ala Val 625 630 635 640 Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Asp Leu Arg Asp Tyr Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala 675 685 Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu 690 695 700 Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Ala Asp Glu Phe 705 710 715 720 Asp Pro Thr Lys His Arg Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln

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Val Leu Pro Ala Val Glu Arg Ile Leu Lys Ala Phe Gly Tyr Arg Lys
740 745 750

Glu Asp Leu Arg Tyr Gln Lys Thr Lys Gln Val Gly Leu Gly Ala Trp 755 760 765

Leu Lys Val Lys Gly Lys Lys 770 775

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<211> 781

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Phe Val Ala Tyr Asp Tyr Asn Phe Asp Pro Tyr Phe Tyr Val Ile Gly 35 40

Val Asp Glu Asp Ile Leu Lys Asn Ala Ala Thr Ser Thr Arg Arg Glu 50 60

Val Ile Lys Leu Lys Ser Phe Glu Lys Ala Gln Leu Lys Thr Leu Gly 65 70 75 80

Arg Glu Val Glu Gly Tyr Ile Val Tyr Ala His His Pro Gln His Val 85 90 95

Pro Lys Leu Arg Asp Tyr Leu Ser Gln Phe Gly Asp Val Arg Glu Ala 100 105 110

Asp Ile Pro Phe Ala Tyr Arg Tyr Leu Ile Asp Lys Asp Leu Ala Cys 115 120 125

Met Asp Gly Ile Ala Ile Glu Gly Glu Lys Gln Gly Gly Val Ile Arg 130 135 140

Ser Tyr Lys Ile Glu Lys Val Glu Arg Ile Pro Arg Met Glu Phe Pro 145 150 155 160

Glu Leu Lys Met Leu Val Phe Asp Cys Glu Met Leu Ser Ser Phe Gly Page 150 Met Pro Glu Pro Glu Lys Asp Pro Ile Ile Val Ile Ser Val Lys Thr 180 185 190

Asn Asp Asp Glu Ile Ile Leu Thr Gly Asp Glu Arg Lys Ile Ile 195 200 205

Ser Asp Phe Val Lys Leu Ile Lys Ser Tyr Asp Pro Asp Ile Ile Val 210 215 220

Gly Tyr Asn Gln Asp Ala Phe Asp Trp Pro Tyr Leu Arg Lys Arg Ala 225 230 235 240

Glu Arg Trp Asn Ile Pro Leu Asp Val Gly Arg Asp Gly Ser Asn Val 245 250 255

Val Phe Arg Gly Gly Arg Pro Lys Ile Thr Gly Arg Leu Asn Val Asp 260 265 270

Leu Tyr Asp Ile Ala Met Arg Ile Ser Asp Ile Lys Ile Lys Lys Leu 275 280 285

Glu Asn Val Ala Glu Phe Leu Gly Thr Lys Ile Glu Ile Ala Asp Ile 290 295 300

Glu Ala Lys Asp Ile Tyr Arg Tyr Trp Ser Arg Gly Glu Lys Glu Lys 305 310 315 320

Val Leu Asn Tyr Ala Arg Gln Asp Ala Ile Asn Thr Tyr Leu Ile Ala 325 330 335

Lys Glu Leu Leu Pro Met His Tyr Glu Leu Ser Lys Met Ile Arg Leu 340 345 350

Pro Val Asp Asp Val Thr Arg Met Gly Arg Gly Lys Gln Val Asp Trp 355 360 365

Leu Leu Ser Glu Ala Lys Lys Ile Gly Glu Ile Ala Pro Asn Pro 370 375 380

Pro Glu His Ala Glu Ser Tyr Glu Gly Ala Phe Val Leu Glu Pro Glu 385 390 395 400

Arg Gly Leu His Glu Asn Val Ala Cys Leu Asp Phe Ala Ser Met Tyr 405 410 415

sequence listing.txt Pro Ser Ile Met Ile Ala Phe Asn Ile Ser Pro Asp Thr Tyr Gly Cys 420 430 Arg Asp Asp Cys Tyr Glu Ala Pro Glu Val Gly His Lys Phe Arg Lys 435 440 445 Ser Pro Asp Gly Phe Phe Lys Arg Ile Leu Arg Met Leu Ile Glu Lys 450 460 Arg Arg Glu Leu Lys Val Glu Leu Lys Asn Leu Ser Pro Glu Ser Ser Glu Tyr Lys Leu Leu Asp Ile Lys Gln Gln Thr Leu Lys Val Leu Thr Asn Ser Phe Tyr Gly Tyr Met Gly Trp Asn Leu Ala Arg Trp Tyr Cys 500 505 510 His Pro Cys Ala Glu Ala Thr Thr Ala Trp Gly Arg His Phe Ile Arg 515 520 525 Thr Ser Ala Lys Ile Ala Glu Ser Met Gly Phe Lys Val Leu Tyr Gly 530 540 Asp Thr Asp Ser Ile Phe Val Thr Lys Ala Gly Met Thr Lys Glu Asp 545 550 560 Val Asp Arg Leu Ile Asp Lys Leu His Glu Glu Leu Pro Ile Gln Ile Glu Val Asp Glu Tyr Tyr Ser Ala Ile Phe Phe Val Glu Lys Lys Arg Tyr Ala Gly Leu Thr Glu Asp Gly Arg Leu Val Val Lys Gly Leu Glu 595 600 Val Arg Arg Gly Asp Trp Cys Glu Leu Ala Lys Lys Val Gln Arg Glu 610 620 Val Ile Glu Val Ile Leu Lys Glu Lys Asn Pro Glu Lys Ala Leu Ser Leu Val Lys Asp Val Ile Leu Arg Ile Lys Glu Gly Lys Val Ser Leu Glu Glu Val Val Ile Tyr Lys Gly Leu Thr Lys Lys Pro Ser Lys Tyr 660

Glu Ser Met Gln Ala His Val Lys Ala Ala Leu Lys Ala Arg Glu Met 675 680 685

Gly Ile Ile Tyr Pro Val Ser Ser Lys Ile Gly Tyr Val Ile Val Lys 690 695 700

Gly Ser Gly Asn Ile Gly Asp Arg Ala Tyr Pro Ile Asp Leu Ile Glu 705 710 715 720

Asp Phe Asp Gly Glu Asn Leu Arg Ile Lys Thr Lys Ser Gly Ile Glu 725 730 735

Ile Lys Lys Leu Asp Lys Asp Tyr Tyr Ile Asp Asn Gln Ile Ile Pro
740 745 750

Ser Val Leu Arg Ile Leu Glu Arg Phe Gly Tyr Thr Glu Ala Ser Leu 755 760 765

Lys Gly Ser Ser Gln Met Ser Leu Asp Ser Phe Phe Ser 770 780

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<211> 824

<212> PRT

<213> Methanococcus voltae

<400> 103

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Lys Asn Cys Gly Leu Lys Lys Pro Glu Ile Asn Leu Gln Lys Glu Cys 20 25 30

Glu Phe Lys Pro Tyr Phe Tyr Val Asp Thr Ser Glu Pro Lys Glu Ile 35 40

Tyr Asp Tyr Leu Asp Gly Leu Asn Gln Glu Ile Asp Leu Lys Lys Leu 50 60

Glu Pro Glu Phe Glu Asn Asn Thr Ser Leu Lys Val Gln Asp Leu Ile 65 70 75 80

Thr Asn Ile Glu Ile Ile Glu Lys Ile Val Tyr Ser Asp Tyr Ile Leu 85 90 95

Asn Gly Lys Asp Ile Ser Glu Val Ser Asp Phe Lys Asn Lys Lys Glu 100 105 110

Arg Lys Ile Cys Lys Val Tyr Val Lys Tyr Pro Asn His Val Lys Ile 115 120 125

Ile Arg Glu Tyr Phe Lys Glu Phe Gly Lys Ser Tyr Glu Phe Asp Ile 130 135 140

Pro Phe Leu Arg Arg Tyr Met Ile Asp Gln Asp Ile Val Pro Ser Ala 145 150 155 160

Lys Tyr Ser Glu Asp Asn Lys Ile Asp Asn Ser Ile Pro Glu Leu Asn 165 170 175

Cys Ile Ala Phe Asp Met Glu Leu Tyr Cys Lys Glu Pro Asn Ala 180 185 190

Lys Lys Asp Pro Ile Ile Met Val Asn Leu Phe Ser Lys Asp Tyr Gln
195 200 205

Lys Val Ile Thr Tyr Lys Lys Phe Glu Asn Ser Glu Tyr Asn Gly Cys 210 215 220

Val Asp Tyr Val Lys Asp Glu Lys Glu Leu Ile Gln Lys Thr Ile Glu 225 230 235 240

Ile Leu Lys Gln Tyr Asp Val Ile Tyr Thr Tyr Asn Gly Asp Asn Phe 245 250 ... 255

Asp Phe Pro Tyr Leu Lys Lys Arg Ala Asn Ile Tyr Glu Ile Glu Leu 260 265 270

Asp Phe Asp Asn Ala Ser Asn Ser Gln Gln Pro Gln Ile Ile Lys Ile 275 280 285

Ser Lys Gly Gly Ile Asn Arg Lys Ser Lys Ile Pro Gly Ile Ile His 290 295 300

Ile Asp Leu Tyr Pro Ile Ala Arg Lys Leu Leu Asn Leu Thr Lys Tyr 305 310 315 320

Lys Leu Glu Asn Val Val Gln Glu Leu Phe Lys Ile Asn Lys Glu Ala 325 330 335

Val Asp Tyr Gly Asp Ile Pro Lys Met Trp Glu Thr Glu Asp Thr Thr 340 350

Leu Leu Arg Tyr Ala Tyr Glu Asp Ala Leu Tyr Thr Tyr Lys Met Gly 355 360 265 Page 154

Asn Tyr Phe Leu Pro Leu Glu Ile Met Phe Ser Arg Ile Val Asn Gln 370 380

Pro Leu Tyr Asp Thr Ser Arg Met Asn Ser Ser Gln Met Val Glu Phe 385 390 400

Leu Leu Leu Lys Arg Ser Phe Glu Gln Asn Met Ile Ser Pro Asn Arg 405 410 415

Pro Ser Ser Ser Tyr Arg Glu Arg Ala Lys Phe Ser Tyr Glu Gly 420 430

Gly Tyr Val Arg Glu Pro Leu Lys Gly Ile Gln Glu Asp Ile Val Ser 435 440 445

Leu Asp Phe Met Ser Leu Tyr Pro Ser Ile Leu Ile Ser His Asn Ile 450 455 460

Ser Pro Glu Thr Val Ile Tyr Glu Glu Lys Glu Arg Glu Asn Met Glu 465 470 475 480

Leu Gly Ile Ile Pro Lys Thr Leu Asn Glu Leu Leu Ser Arg Arg Lys 485 490 495

His Ile Lys Met Leu Leu Lys Asp Lys Ile Gln Lys Asn Glu Phe Asp 500 505 510

Glu Glu Tyr Ser Arg Leu Glu His Glu Gln Lys Ser Ile Lys Val Leu 515 520 525

Ala Asn Ser His Tyr Gly Tyr Leu Ala Phe Pro Met Ala Arg Trp Tyr 530 540

Ser Asp Lys Cys Ala Glu Met Val Thr Gly Leu Gly Arg Lys Tyr Ile 545 550 560

Gln Glu Thr Ile Glu Lys Ala Glu Glu Phe Gly Phe Lys Val Ile Tyr 565 570 575

Ala Asp Thr Asp Gly Phe Tyr Ala Lys Trp Asp Tyr Asp Lys Leu Gln 580 590

Lys Gly Lys Lys Glu Glu Asn Asp Lys Ser Asp Lys Leu Ser Asn Leu 595 600

Pro Lys Leu Ser Lys Glu Glu Leu Ile Ile Leu Thr Lys Lys Phe Leu Page 155 Lys Gly Ile Asn Glu Glu Leu Pro Glu Gly Met Glu Leu Glu Phe Glu 625 630 635 640

Gly His Phe Lys Arg Gly Leu Phe Val Thr Lys Lys Lys Tyr Ala Leu 645 650 655

Ile Glu Asp Asp Gly His Ile Val Val Lys Gly Leu Glu Val Val Arg 660 665 670

Arg Asp Trp Ser Asn Ile Ala Lys Asp Thr Gln Gln Ala Val Ile Arg 675 680 685

Ala Leu Leu Glu Asp Gly Asp Val Asn Leu Ala Lys Lys Ile Ile Lys 690 695 700

Asn Thr Ile Asp Asn Leu Lys Lys Gly Asn Ile Asp Lys Asn Asp Leu 705 710 715 720

Leu Ile His Thr Gln Leu Thr Lys Asn Ile Glu Glu Tyr Lys Ser Thr 725 730 735

Ala Pro His Ile Glu Val Ala Lys Lys Ile Lys Gln Arg Gly Asp Ser 740 745 750

Val Arg Val Gly Asp Val Ile Ser Tyr Ile Ile Val Lys Gly Ser Arg 755 760 765

Ser Ile Ser Glu Arg Ala Glu Leu Leu Glu Tyr Ala Gly Asp Tyr Asp 770 780

Ile Asn Tyr Tyr Ile Asp Asn Gln Val Leu Pro Pro Val Ile Arg Ile 785 790 795 800

Met Glu Ser Leu Gly Ile Ser Glu Asp Glu Leu Lys Asn Ser Gly Lys 805 810 815

Gln Phe Lys Leu Asp Gln Phe Met 820

<210> 104

<211> 785

<212> PRT

<213> Pyrobaculum islandicum

<400> 104

Met Glu Leu Lys Val Trp Pro Leu Asp Ile Thr Tyr Ala Val Val Gly Page 156 1

Ser Val Pro Glu Ile Arg Ile Phe Gly Ile Leu Ser Ser Gly Glu Arg
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Val Val Leu Ile Asp Arg Ser Phe Lys Pro Tyr Phe Tyr Val Asp Cys 35 40 45

Ala Val Cys Glu Pro Ala Ala Leu Lys Thr Ala Leu Ser Arg Val Ala 50 55 60

Pro Ile Asp Asp Val Gln Ile Val Glu Arg Arg Phe Leu Gly Arg Ser 65 70 75 80

Lys Lys Phe Leu Lys Val Ile Ala Lys Ile Pro Glu Asp Val Arg Lys 85 90 95

Leu Arg Glu Ala Ala Met Ser Ile Pro Arg Val Ser Gly Val Tyr Glu 100 105 110

Ala Asp Ile Arg Phe Tyr Met Arg Tyr Met Ile Asp Met Gly Val Val 115 120 125

Pro Cys Ser Trp Asn Val Ala Glu Val Glu Glu Gly Gly Arg Leu Gly 130 135 140

Gly Ile Pro Thr Tyr Val Val Ser Gln Trp Tyr Gly Ile Asp Glu Gly 155 150

Phe Pro Pro Ser Leu Lys Val Met Ala Phe Asp Ile Glu Val Tyr Asn 165 170 175

Glu Arg Gly Ser Pro Asp Pro Ile Arg Asp Pro Val Val Met Leu Ala 180 185 190

Ile Lys Thr Asn Asp Gly His Glu Glu Val Phe Glu Ala Ser Gly Lys 195 200 205

Asp Asp Arg Gly Val Val Arg Ala Phe Val Asp Phe Ile Arg Ser Tyr 210 215 220

Asp Pro Asp Val Ile Val Gly Tyr Asn Ser Asn Gly Phe Asp Trp Pro 225 230 235 240

Tyr Leu Val Glu Arg Ala Lys Ala Val Gly Val Pro Leu Lys Val Asp 245 250 255

Arg	Leu	Ser	Asn 260	Pro	Pro	Gln	Gln	sequ Ser 265	val	Tyr	Gly	His	Trp 270	Ser	Ile
val	Gly	Arg 275	Ala	Asn	Val	Asp	Leu 280	Tyr	Asn	Ile	۷al	G]u 285	Glu	Phe	Pro
Glu	Ile 290	Lys	Leu	Lys	Thr	Leu 295	Asp	Arg	Val	Ala	G]u 300	Tyr	Phe	Gly	val
Met 305	Lys	Arg	Glu	Glu	Arg 310	Val	Leu	Ile	Pro	Gly 315	His	Lys	Ile	Tyr	Glu 320
Tyr	Trp	Lyś	Asp	Pro 325	Asn	Lys	Arg	Pro	Leu 330	Leu	Lys	Arg	Tyr	va1 335	Leu
Asp	Asp	٧a٦	Arg 340	Ser	Thr	Leu	Gly	Leu 345	Ala	Asp	Lys	Leu	Leu 350	Pro	Phe
Leu	Ile	Gln 355	Leu	Ser	Ser	val	Ser 360	Gly	Leu	Pro	Leu	Asp 365	Gln	val	Ala
Αla	Ala 370		val	Gly	Asn	Arg 375	val	Glu	Тгр	Met	Leu 380	Leu	Arg	Tyr	Ala
Tyr 385	Arg	Leu	Gly	Glu	va1 390	Ala	Pro	Asn	Arg	G]u 395	Glu	Arg	Glu	Туг	Glu 400
Pro	Tyr	Lys	Gly	Ala 405		۷a٦	Leu	Glu	Pro 410	Lys	Pro	Gly	Met	Tyr 415	Glu
Asp	۷a٦	Leu	val 420	Leu	Asp	Phe	Ser	Ser 425	Met	Tyr	Pro	Asn	11e 430	Met	Met
Lys	Tyr	435		Ser	Pro	Asp	Thr 440	Tyr	Leu	Glu	Pro	G1y 445	Glu	Pro	Asp
Pro	Pro 450		ı Gly	val	Asn	Va1 455	Ala	Pro	Glu	val	Gly 460	His	Arg	Phe	Arg
Arg 465		Pro) Pro	Gly	Phe 470		Pro	Glr	val	Leu 475	Lys	ser	Leu	۷a٦	Glu 480
Leu	ı Arg	j Lys	s Ala	val 485	Arg	Glu	ı Glu	Ala	1 Lys 490	Lys)	туг	Pro) Pro	Asp 495	Ser
Pro	G]ı	ı Phe	E Lys 500	ile)	e Leu	AS	o Glu	Arg 505	g Glr	n Arg	ı Ala	Leu	1 Lys 510	Val	Met

Ala Asn Ala Ile Tyr Gly Tyr Leu Gly Trp Val Gly Ala Arg Trp Tyr 515 525

Lys Arg Glu Val Ala Glu Ser Val Thr Ala Phe Ala Arg Ala Ile Leu 530 535 540

Lys Asp Val Ile Glu Gln Ala Arg Arg Leu Gly Ile Val Val Tyr 545 550 560

Gly Asp Thr Asp Ser Leu Phe Val Lys Lys His Gly Asp Val Asp Lys 565 570 575

Leu Ile Lys Tyr Val Glu Glu Lys Tyr Gly Ile Asp Ile Lys Val Asp 580 585 590

Lys Asp Tyr Ala Lys Val Leu Phe Thr Glu Ala Lys Lys Arg Tyr Ala 595 605

Gly Leu Leu Arg Asp Gly Arg Ile Asp Ile Val Gly Phe Glu Val Val 610 620

Arg Gly Asp Trp Ser Glu Leu Ala Lys Asp Val Gln Leu Arg Val Ile 625 630 635 640

Glu Ile Ile Leu Lys Ser Arg Asp Ile Val Glu Ala Arg His Gly Val 645 650 655

Ile Lys Tyr Ile Arg Glu Ile Ile Glu Arg Leu Lys Asn Tyr Lys Phe 660 665 670

Asn Ile Asp Asp Leu Ile Ile Trp Lys Thr Leu Asp Lys Glu Leu:Asp 675 685

Glu Tyr Lys Ala Tyr Pro Pro His Val His Ala Ala Gln Ile Leu Lys 690 695 700

Arg His Gly Tyr Arg Val Gly Lys Gly Thr Thr Ile Gly Tyr Val Ile 705 710 715 720

Val Lys Gly Glu Lys Val Ser Glu Arg Ala Leu Pro Tyr Ile Leu 725 730 735

Leu Asp Asp Ile Lys Lys Ile Asp Ile Asp Tyr Tyr Ile Glu Arg Gln
740 745 750

Ile Ile Pro Ala Ala Leu Arg Ile Ala Glu Val Ile Gly Val Lys Glu 755 760 765 Page 159

Ser Asp Leu Lys Thr Gly Arg Met Glu Arg Ser Leu Leu Asp Phe Leu 770 775 780

Ser 785

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<211> 844

<212> PRT <213> Cenarchaeum symbiosum

<400> 105

Met Thr Val Gln Asp Ala Val Glu Ile Pro Pro Ser Leu Leu Val Ser 1 10 15

Ala Thr Tyr Asp Ser Gln Ala Gly Ala Val Val Leu Lys Phe Tyr Glu 20 25 30

Pro Glu Ser Gln Lys Ile Val His Trp Thr Asp Asn Thr Gly His Lys 35 40 45

Pro Tyr Cys Tyr Thr Arg Gln Pro Pro Ser Glu Leu Gly Glu Leu Glu 50 60

Gly Arg Glu Asp Val Leu Gly Thr Glu Gln Val Met Arg His Asp Leu 65 70 75 80

Ile Ala Asp Lys Asp Val Pro Val Thr Lys Ile Thr Val Ala Asp Pro 85 90 95

Leu Ala Ile Gly Gly Thr Asn Ser Glu Lys Ser Ile Arg Asn Ile Met 100 105 110

Asp Thr Trp Glu Ser Asp Ile Lys Tyr Tyr Glu Asn Tyr Leu Tyr Asp 115 120 125

Lys Ser Leu Val Val Gly Arg Tyr Tyr Ser Val Ser Gly Gly Lys Val 130 135 140

Ile Pro His Asp Met Pro Ile Ser Asp Glu Val Lys Leu Ala Leu Lys 145 150 155 160

Ser Leu Leu Trp Asp Lys Val Val Asp Glu Gly Met Ala Asp Arg Lys 165 170 175

Glu Phe Arg Glu Phe Ile Ala Gly Trp Ala Asp Leu Leu Asn Gln Pro 180 185 190 Page 160

Ile Pro Arg Ile Arg Arg Leu Ser Phe Asp Ile Glu Val Asp Ser Glu 195 200 205

Glu Gly Arg Ile Pro Asp Pro Lys Ile Ser Asp Arg Arg Val Thr Ala 210 215 220

Val Gly Phe Ala Ala Thr Asp Gly Leu Lys Gln Val Phe Val Leu Arg 225 230 235 240

Ser Gly Ala Glu Glu Gly Glu Asn Gly Val Thr Pro Gly Val Glu Val 245 250 255

Val Phe Tyr Asp Lys Glu Ala Asp Met Ile Arg Asp Ala Leu Ser Val 260 265 270

Ile Gly Ser Tyr Pro Phe Val Leu Thr Tyr Asn Gly Asp Asp Phe Asp 275 280 285

Met Pro Tyr Met Leu Asn Arg Ala Arg Arg Leu Gly Val Ser Asp Ser 290 295 300

Asp Ile Pro Leu Tyr Met Met Arg Asp Ser Ala Thr Leu Arg His Gly 305 310 315

Val His Leu Asp Leu Tyr Arg Thr Phe Ser Asn Arg Ser Phe Gln Leu 325 330 335

Tyr Ala Phe Ala Ala Lys Tyr Thr Asp Tyr Ser Leu Asn Ser Val Thr 340 345 350

Lys Ala Met Leu Gly Glu Gly Lys Val Asp Tyr Gly Val Lys Leu Gly 355 360 365

Asp Leu Thr Leu Tyr Gln Thr Ala Asn Tyr Cys Tyr His Asp Ala Arg 370 375 380

Leu Thr Leu Glu Leu Ser Thr Phe Gly Asn Glu Ile Leu Met Asp Leu 385 390 395 400

Leu Val Val Thr Ser Arg Ile Ala Arg Met Pro Ile Asp Asp Met Ser 405 410 415

Arg Met Gly Val Ser Gln Trp Ile Arg Ser Leu Leu Tyr Tyr Glu His 420 430

Arg Gln Arg Asn Ala Leu Ile Pro Arg Arg Asp Glu Leu Glu Gly Arg Page 161 Ser Arg Glu Val Ser Asn Asp Ala Val Ile Lys Asp Lys Lys Phe Arg 450 455 460

Gly Gly Leu Val Val Glu Pro Glu Glu Gly Ile His Phe Asp Val Thr 465 470 475 480

Val Met Asp Phe Ala Ser Leu Tyr Pro Ser Ile Ile Lys Val Arg Asn 485 490 495

Leu Ser Tyr Glu Thr Val Arg Cys Val His Ala Glu Cys Lys Lys Asn 500 510

Thr Ile Pro Asp Thr Asn His Trp Val Cys Thr Lys Asn Asn Gly Leu 515 520 525

Thr Ser Met Ile Ile Gly Ser Leu Arg Asp Leu Arg Val Asn Tyr Tyr 530 535 540

Lys Ser Leu Ser Lys Ser Thr Ser Ile Thr Glu Glu Gln Arg Gln Gln 545 550 555 560

Tyr Thr Val Ile Ser Gln Ala Leu Lys Val Val Leu Asn Ala Ser Tyr 565 570 575

Gly Val Met Gly Ala Glu Ile Phe Pro Leu Tyr Phe Leu Pro Ala Ala 580 585 590

Glu Ala Thr Thr Ala Val Gly Arg Tyr Ile Ile Met Gln Thr Ile Ser 595 600

His Cys Glu Gln Met Gly Val Arg Val Leu Tyr Gly Asp Thr Asp Ser 610 620

Leu Phe Ile Lys Asp Pro Glu Glu Arg Gln Ile His Glu Ile Val Glu 625 630 635 640

His Ala Lys Lys Glu His Gly Val Glu Leu Glu Val Asp Lys Glu Tyr
645 650 655

Arg Tyr Val Val Leu Ser Asn Arg Lys Lys Asn Tyr Phe Gly Val Thr 660 665 670

Arg Ala Gly Lys Val Asp Val Lys Gly Leu Thr Gly Lys Lys Ser His 675 685

sequence listing.txt Thr Pro Pro Phe Ile Lys Glu Leu Phe Tyr Ser Leu Leu Asp Ile Leu Ser Gly Val Glu Ser Glu Asp Glu Phe Glu Ser Ala Lys Met Arg Ile 705 710 715 720 Ser Lys Ala Ile Ala Ala Cys Gly Lys Arg Leu Glu Glu Arg Gln Ile 725 730 735 Pro Leu Val Asp Leu Ala Phe Asn Val Met Ile Ser Lys Ala Pro Ser 745 750 Glu Tyr Val Lys Thr Val Pro Gln His Ile Arg Ala Ala Arg Leu Leu 755 760 765 Glu Asn Ala Arg Glu Val Lys Lys Gly Asp Ile Ile Ser Tyr Val Lys 770 775 780 Val Met Asn Lys Thr Gly Val Lys Pro Val Glu Met Ala Arg Ala Gly 785 790 795 800 Glu Val Asp Thr Ser Lys Tyr Leu Glu Phe Met Glu Ser Thr Leu Asp 815 Gln Leu Thr Ser Ser Met Gly Leu Asp Phe Asp Glu Ile Leu Gly Lys 820 Pro Lys Gln Thr Gly Met Glu Gln Phe Phe Lys 106 <210> <211> 875 <212> **PRT** Sulfolobus acidocaldarius <213> <400> 106 Met Ser Lys Gln Ala Thr Leu Phe Asp Phe Ser Ile Lys Lys Asn Glu 1 5 10 Ser Lys Glu Gln Thr Asn Gln Glu Ser Val Glu Val Pro Lys Gln Thr 20 25 30 Ala Asn Arg Thr Lys Ile Glu Trp Ile Lys Glu Ala Glu Asp Gly Lys 35 40 45 Val Tyr Phe Leu Leu Gln Val Asp Tyr Asp Gly Lys Lys Ser Arg Ala 50 60

va1 65	Cys	Lys	Leu	туг	Asp 70	Lys	Glu	sequ Gly	ience Lys	lis Lys 75	ting Ile	.txt Tyr	Ile	Met	Gln 80
Asp	Glu	Ser	Gly	ніs 85	Lys	Pro	туг	Phe	Leu 90	Thr	Asp	Ile	Asp	Pro 95	Asp
Lys	val	Asn	Lys 100	Ile	Thr	Lys	Val	Val 105	Arg	Asp	Pro	Ser	Phe 110	Asp	His
Leu	Glu	Leu 115	Ile	Asn	Lys	٧a٦	Asp 120	Pro	туг	Thr	Gly	Lys 125	Lys	Ile	Arg
Leu	Thr 130	Lys	Ile	val	val	Lys 135	Asp	Pro	Leu	Ala	Val 140	Arg	Arg	Met	Arg
Ser 145	Ser	Leu	Pro	Lys	Ala 150	Tyr	Glu	Ala	His	Ile 155	Lys	Tyr	Tyr	Asn	Asn 160
туг	Val	туr	Asp	Asn 165	Gly	Leu	Ile	Pro	Gly 170	Leu	Ile	Tyr	Lys	Val 175	Asn
Lys	Gly	Lys	Leu 180	Thr	Gln	Leu	Asn	Pro 185	Glu	Leu	Lys	Gly	Glu 190	Glu	Ile
Asn	Glu	Ile 195		Lys	Leu	Ser	Asp 200		Tyr	Glu	Met	Thr 205	Lys	Glu	Thr
Val	Asn 210		Trp	Ile	Pro	Ile 215	Leu	⊕ Glu	Thr	Glu	va1 220	Pro	Asp	Ile	Lys
Arg 225		Ser	Leu	Asp	Ile 230	Glu	val	Tyr	Thr	Pro 235	Asn	Arg	Gly	Arg	11e 240
Pro	Asp	Pro	Glu	Arg 245	Ala	Glu	Phe	Pro	1]e 250	ıle	Ser	val	Ala	Leu 255	Ala
Gly	⁄ Asn	ı Asp	Gly 260		· Lys	ΙÌe	val	Leu 265	ı Ala	. Leu	Lys	Arg	Glu 270	Asp	۷a٦
Asr	ser	Asp 275	Phe	e Ser	· Lys	Lys	280	Gly	∕ Val	Gln	\Val	G1u 285	Ile	Phe	Asp
Ser	- Glu 290		5 Lys	s Lei	ı Leu	Ala 295	a Arg	j Lei	ı Phe	e Glu	11e 300	Ile	. Arg	g]u	Tyr
Pro 305		t Lei	ı Lei	ı Thi	7 Phe 310	ASr	ı Gly	/ Asp) Asp	9 Phe	e Asp	ıle	Pro	Tyr	lle 320

sequence listing.txt Tyr Phe Arg Ala Leu Arg Leu Asn Phe Ser Pro Glu Glu Val Pro Leu 330 Asp val val Ser Gly Glu Gly Lys Phe Leu Ala Gly Ile His Ile Asp Leu Tyr Lys Phe Phe Phe Asn Arg Ala Val Ser Ile Tyr Ala Phe Glu 355 360 365 Gly Lys Tyr Ser Glu Tyr Ser Leu Tyr Ala Val Ala Thr Ala Leu Leu 370 375 380 Gly Ile Ser Lys Val Lys Leu Asp Thr Phe Ile Ser Phe Met Asp Ile 385 390 400 Asp Lys Leu Ile Glu Tyr Asn Leu Arg Asp Ala Glu Ile Thr Leu Lys 405 410 415 Leu Thr Thr Phe Asn Asn Leu Val Leu Lys Leu Met Val Leu Leu Ala Arg Ile Ser Lys Leu Gly Leu Glu Glu Leu Thr Arg Thr Glu Val 435 440 445 Ser Thr Trp Ile Lys Asn Leu Tyr Tyr Trp Glu His Arg Lys Arg Asn Trp Leu Ile Pro Leu Lys Glu Glu Ile Leu Val Arg Ser Asn Gln Val 465 470 480 Lys Thr Ala Ala Val Ile Lys Gly Lys Lys Tyr Lys Gly Ala Val Val 485 490 495 Ile Asp Pro Pro Ala Gly Val Tyr Phe Asn Val Val Leu Asp Phe Ala Ser Leu Tyr Pro Ser Ile Ile Lys Asn Trp Asn Ile Ser Tyr Glu 515 520 525 Thr Ile Glu Ile Asp Glu Cys Thr Lys Lys Val Trp Val Glu Asp Glu 530 540

Ala Val Tyr Gln Gly Leu Ile Arg Asp Phe Arg Val Lys Val Tyr Lys
565 570 575
Page 165

Thr Gly Glu Lys Leu His Tyr Val Cys Met Asp Lys Pro Gly Ile Thr 545 550 560

Lys Lys Ala Lys Tyr Ser Asn Ile Ser Glu Glu Gln Arg Ser Leu Tyr 580 585 590

Asp Val Val Gln Arg Ala Met Lys Val Phe Ile Asn Ala Thr Tyr Gly 595 600 605

Val Phe Gly Ala Glu Asn Phe Pro Leu Tyr Ala Pro Ala Val Ala Glu 610 615 620

Ser Val Thr Ala Ile Gly Arg Tyr Ile Ile Thr Thr Thr Tyr Lys Gln 625 630 635

Ala Glu Lys Leu Asn Leu Lys Val Ile Tyr Gly Asp Thr Asp Ser Leu 645 650 655

Phe Leu Tyr Asn Pro Thr Lys Asp Lys Leu Glu Glu Leu Ile Lys Phe 660 665 670

Val Lys Gln Asn Phe Asn Leu Asp Leu Glu Val Asp Asn Thr Tyr Lys 675 680 685

Tyr Val Ala Tyr Ser Gly Leu Lys Lys Asn Tyr Phe Gly Val Tyr Pro 690 695 700

Asp Gly Lys Thr Glu Ile Lys Gly Met Leu Ala Lys Lys Arg Asn Thr 705 710 715 720

Pro Glu Phe Ile Lys Lys Glu Phe Ala Glu Ile Lys Asn Met Leu Ala 725 730 735

Ser Leu Asn Ser Pro Asn Asp Ile Pro Glu Val Lys Asn Lys Leu Glu 740 750

Ile Lys Ile Lys Asp Ile Tyr Tyr Lys Leu Arg Asn Lys Gly Tyr Asn 755 760 765

Leu Asp Asp Leu Ala Phe Arg Ile Met Leu Ser Lys Pro Leu Asp Ser 770 780

Tyr Thr Lys Asn Thr Pro Gln His Val Lys Ala Gly Leu Gln Leu Arg 785 790 795 800

Ala Phe Gly Val Asn Val Leu Pro Arg Asp Val Ile Met Phe Val Lys 805 810 815

Val Lys Ser Lys Asp Gly Val Lys Ala Tyr Gln Leu Ala Lys Ile Ser Page 166 Glu Ile Asp Ile Glu Lys Tyr Val Glu Thr Leu Arg Thr Thr Phe Glu 835 840 845

Gln Ile Leu Lys Ala Phe Gly Ile Ser Trp Asp Glu Ile Val Ser Thr 850 855 860

Ile Ser Ile Asp Ser Phe Phe Gly Ser Lys Lys 865 870 875

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<400> 107

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Glu Glu Arg Arg Lys Pro Lys Glu Trp Ile Lys Glu Ala Glu Glu Gly 35 40 45

Lys Ser Tyr Phe Leu Leu Gln Val Asp Tyr Asp Gly Lys Lys Ser Lys 50 60

Ala Ile Cys Lys Leu Tyr Asp Lys Glu Thr Lys Lys Ile Tyr Ile Leu 65 70 75

Tyr Asp Asn Thr Gly His Lys Pro Tyr Phe Leu Thr Asp Ile Asp Pro 90 95

Glu Lys Val Asn Lys Ile Pro Lys Val Val Arg Asp Pro Ser Phe Asp 100 105 110

His Leu Glu Thr Val Ile Lys Ile Asp Pro Tyr Ser Gly Asn Lys Ile 115 120 125

Lys Leu Thr Lys Ile Val Val Lys Asp Pro Leu Ala Val Arg Arg Met 130 135 140

Arg Asn Ser Val Pro Lys Ala Tyr Glu Ala His Ile Lys Tyr Phe Asn 145 150 155 160

Asn Tyr Ile Tyr Asp Leu Gly Leu Ile Pro Gly Leu Pro Tyr Val Val Page 167 Lys Lys Gly Lys Leu Glu Gln Leu Arg Pro Glu Leu Lys Gly Glu Glu 180 185 190

Val Asp Glu Ile Arg Lys Ala Phe Ala Asp Ser Asp Glu Met Thr Lys 195 200 205

Glu Ala Val Asn Asp Trp Ile Pro Ile Phe Glu Ser Glu Val Pro Asp 210 215 220

Val Lys Arg Val Ala Ile Asp Ile Glu Val Tyr Thr Pro Ile Lys Gly 225 230 235

Arg Ile Pro Asp Pro Glu Lys Ala Glu Phe Pro Ile Ile Ser Ile Ser 245 250 255

Leu Ala Gly Asn Asp Gly Thr Lys Arg Val Leu Val Leu Leu Arg Glu 260 265 270

Asp Val Asn Ser Gln Ile Thr Lys His Asp Val Ile Val Glu Thr Phe 275 280 285

Lys Ser Glu Arg Glu Leu Ile Arg Arg Phe Phe Asp Ile Ile Leu Asp 290 295 300

Tyr Pro Ile Ile Leu Thr Phe Asn Gly Asp Asp Phe Asp Ile Pro Tyr 305 310 315

Ile Tyr Tyr Arg Ala Leu Lys Leu Asn Phe Thr Pro Glu Glu Ile Pro 325 330 335

Phe Asp Ile Ile Asn Asp Glu Gly Lys Tyr Leu Ala Gly Ile His Ile 340 345

Asp Leu Tyr Lys Phe Phe Phe Asn Arg Ala Ile Arg Asn Tyr Ala Phe 355 360 365

Glu Gly Lys Tyr Asn Glu Tyr Asn Leu Asp Ala Val Ala Thr Ala Leu 370 375 380

Leu Gly Met Ser Lys Val Lys Leu Asp Thr Leu Ile Ser Phe Leu Asp 385 390 395

Leu Asp Lys Leu Ile Glu Tyr Asn Ser Arg Asp Ala Glu Ile Thr Leu 405 410 415

Lys	Leu	Thr	Thr 420	Phe	Asn	Asn	Asn	sequ Leu 425	ence Val	lis Trp	ting. Lys l	.txt _eu]	[]e I 430	le L	.eu
Leu	Ala	Arg 435	Ile	Ser	Lys	Met	Gly 440	Leu	Glu	Glu	Leu '	Thr / 445	Arg T	hr (ilu
val	Ser 450	Thr	Trp	Ile	Lys	Asn 455	Leu	туг	туr	Trp	G1u 460	His /	Arg A	Arg A	Arg
Asn 465	Тгр	Leu	Ile	Pro	Leu 470	Lys	Glu	Glu	Ile	Leu 475	Thr	Arg	Ser S	Ser (Gln 480
Ile	Lys	Thr	Ala	Ala 485	Ile	Ile	Lys	Gly	Lys 490	Arg	Tyr	Lys	Gly ,	Ala 495	val
val	Ιle	. Asp	Pro 500	Pro	Ala	Gly	Val	Phe 505	Phe	Asn	val	val	val 510	Leu	Asp
Phe	e Ala	s Sei 51!	Leu 5	ı Tyr	Pro	Ser	11e 520	Ile	Arg	Asn	Тгр	Asn 525	Ile	Ser	Tyr
G٦ι	ı Thi 530	r va [:]	l Asp	va ¹	l Glu	Asr 535	cys	Lys	Asn	Lys	G1u 540	туr	val	Arg	Asp
G] (и Th 5	r Gl	y Glu	u Va	1 Leu 550	ı His)	s Tyr	· Ile	e Cys	555	Asp	Lys	Pro	Gly	11e 560
Th	r Al	a Va	וו ו	e Th 56	r Gly 5	/ Le	u Lei	u Arg	3 Asp 570	Phe	e Arg	Val	Lys	va1 575	туr
Ly	s Ly	's Ly	s Al 58	a Ly O	s Se	r Gl	n As	n Ile 58	e Sei 5	r Gli	u Glu	ı Gln	Arg 590	Ser	val
Ту	r As	sp Va 59	11 Va 95	ıl Gl	n Ar	g Al	а ме 60	t Ly O	s Va) Ph	e Ile	e Asr 605	ı Ala	Thr	Tyr
G٦		al Ph LO	ne Gl	y Al	a Gl	u As 61	n Ph .5	e Pr	o Le	и Ту	r Ala 620	a Pro	Ala	val	Ala
G ⁻	lu Se 25	er V	al Th	nr Al	la Il 63	e GT	y Ar	ъд Ту	r Va	1 I1 63	e Th	r Th	r Thr	· val	Asn 640
T	yr C	ys A	rg S	er I	le G1 45	y Le	eu Gl	In Va	al Le	u Ту i0	r Gl	y As	p Thi	- Asp 65	ser
М	et P	he L	eu T 6	rp A 60	sn Pi	ro S	er Ly	ys G ⁻ 60	lu Ly 65	/S Le	eu Gl	u G1	u Il 670	e Il O	e Lys

Phe Val Lys Gly Lys Phe Gly Leu Asp Leu Glu Val Asp Lys Val Tyr 675 680 685

Lys Phe Val Ala Phe Ser Gly Leu Lys Lys Asn Tyr Leu Gly Val Tyr 690 695 700

Pro Asp Gly Lys Thr Asp Ile Lys Gly Met Leu Ala Lys Lys Arg Asn 705 710 715 720

Thr Pro Glu Phe Ile Lys Lys Glu Phe Asn Glu Val Lys Gln Leu Val 725 730 735

Thr Thr Ile Asn Ser Pro Asp Asp Ile Pro Lys Ile Arg Asp Gln Leu 740 750

Glu Tyr Lys Ile Lys Glu Ile Tyr Glu Lys Leu Arg His Lys Gly Tyr 755 760 765

Asn Leu Asp Glu Leu Ala Phe Arg Val Met Leu Ser Lys Pro Leu Glu 770 775 780

Ser Tyr Thr Lys Asn Thr Pro Gln His Val Lys Ala Ala Leu Gln Leu 785 790 795 800

Arg Ser Tyr Gly Val Met Val Leu Pro Arg Asp Ile Ile Met Phe Val 805 810 815

Lys Val Lys Ser Lys Asp Gly Val Lys Pro Val Gln Leu Ala Lys Leu 820 825 830

Ser Glu Ile Asp Val Asp Lys Tyr Ile Asp Ala Val Arg Ser Thr Phe 835 840 845

Glu Gln Ile Leu Lys Ala Phe Gly Leu Ile Gly Ala Asn Leu Leu Gln 850 855 860

Leu Leu Ser Ile Leu Ser Leu Thr 865 870

<210> 108

<211> 882 <212> PRT

<213> Sulfolobus solfataricus

<400> 108

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Lys Ser Glu Gln Asn Thr Gln Gln Ser Gln Gln Ser Ala Pro Val Glu 20 25 30 Glu Lys Lys Val Val Arg Arg Glu Trp Leu Glu Glu Ala Gln Glu Asn 35 40 Lys Ile Tyr Phe Leu Leu Gln Val Asp Tyr Asp Gly Lys Lys Gly Lys 50 60 Ala Val Cys Lys Leu Phe Asp Lys Glu Thr Gln Lys Ile Tyr Ala Leu 65 70 75 80 Tyr Asp Asn Thr Gly His Lys Pro Tyr Phe Leu Val Asp Leu Glu Pro 85 90 95 Asp Lys Val Gly Lys Ile Pro Lys Ile Val Arg Asp Pro Ser Phe Asp 100 105 110His Ile Glu Thr Val Ser Lys Ile Asp Pro Tyr Thr Trp Asn Lys Phe 115 125 Lys Leu Thr Lys Ile Val Val Arg Asp Pro Leu Ala Val Arg Arg Leu 130 135 140 Arg Asn Asp Val Pro Lys Ala Tyr Glu Ala His Ile Lys Tyr Phe Asn 145 . 150 155 160 Asn Tyr Met Tyr Asp Ile Gly Leu Ile Pro Gly Met Pro Tyr Val Val 165 170 175 Lys Asn Gly Lys Leu Glu Ser Val Tyr Leu Ser Leu Asp Glu Lys Asp 180 185 Val Glu Glu Ile Lys Lys Ala Phe Ala Asp Ser Asp Glu Met Thr Arg Gln Met Ala Val Asp Trp Leu Pro Ile Phe Glu Thr Glu Ile Pro Lys 215 Ile Lys Arg Val Ala Ile Asp Ile Glu Val Tyr Thr Pro Val Lys Gly 225 230 235 Arg Ile Pro Asp Ser Gln Lys Ala Glu Phe Pro Ile Ile Ser Ile Ala 245 250 255

Leu Ala Gly Ser Asp Gly Leu Lys Lys Val Leu Val Leu Asn Arg Asn 260 265 270 Page 171

Asp Val Asn Glu Gly Ser Val Lys Leu Asp Gly Ile Ser Val Glu Arg 275 280 285

Phe Asn Thr Glu Tyr Glu Leu Leu Gly Arg Phe Phe Asp Ile Leu Leu 290 295 300

Glu Tyr Pro Ile Val Leu Thr Phe Asn Gly Asp Asp Phe Asp Leu Pro 305 310 315

Tyr Ile Tyr Phe Arg Ala Leu Lys Leu Gly Tyr Phe Pro Glu Glu Ile 325 330 335

Pro Ile Asp Val Ala Gly Lys Asp Glu Ala Lys Tyr Leu Ala Gly Leu 340 345 350

His Ile Asp Leu Tyr Lys Phe Phe Phe Asn Lys Ala Val Arg Asn Tyr 355 360 365

Ala Phe Glu Gly Lys Tyr Asn Glu Tyr Asn Leu Asp Ala Val Ala Lys 370 375 380

Ala Leu Leu Gly Thr Ser Lys Val Lys Val Asp Thr Leu Ile Ser Phe 385 390 395 400

Leu Asp Val Glu Lys Leu Ile Glu Tyr Asn Phe Arg Asp Ala Glu Ile 405 410 415

Thr Leu Gln Leu Thr Thr Phe Asn Asn Asp Leu Thr Met Lys Leu Ile 420 430

Val Leu Phe Ser Arg Ile Ser Arg Leu Gly Ile Glu Glu Leu Thr Arg 435 440 445

Thr Glu Ile Ser Thr Trp Val Lys Asn Leu Tyr Tyr Trp Glu His Arg 450 455 460

Lys Arg Asn Trp Leu Ile Pro Leu Lys Glu Glu Ile Leu Ala Lys Ser 465 470 475 480

Ser Asn Ile Arg Thr Ser Ala Leu Ile Lys Gly Lys Gly Tyr Lys Gly 485 490 495

Ala Val Val Ile Asp Pro Pro Ala Gly Ile Phe Phe Asn Ile Thr Val 500 505

Leu Asp Phe Ala Ser Leu Tyr Pro Ser Ile Ile Arg Thr Trp Asn Leu Page 172 Ser Tyr Glu Thr Val Asp Ile Gln Gln Cys Lys Lys Pro Tyr Glu Val 530 535 540 Lys Asp Glu Thr Gly Glu Val Leu His Ile Val Cys Met Asp Arg Pro 545 550 560 Gly Ile Thr Ala Val Ile Thr Gly Leu Leu Arg Asp Phe Arg Val Lys Ile Tyr Lys Lys Lys Ala Lys Asn Pro Asn Asn Ser Glu Glu Gln Lys
580 585 590 Leu Leu Tyr Asp Val Val Gln Arg Ala Met Lys Val Phe Ile Asn Ala 595 600 605 Thr Tyr Gly Val Phe Gly Ala Glu Thr Phe Pro Leu Tyr Ala Pro Ala 610 620 Val Ala Glu Ser Val Thr Ala Leu Gly Arg Tyr Val Ile Thr Ser Thr Val Lys Lys Ala Arg Glu Glu Gly Leu Thr Val Leu Tyr Gly Asp Thr 645 650 655 Asp Ser Leu Phe Leu Leu Asn Pro Pro Lys Asn Ser Leu Glu Asn Ile Ile Lys Trp Val Lys Thr Thr Phe Asn Leu Asp Leu Glu Val Asp Lys 675 680 685 Thr Tyr Lys Phe Val Ala Phe Ser Gly Leu Lys Lys Asn Tyr Phe Gly 690 695 700 Val Tyr Gln Asp Gly Lys Val Asp Ile Lys Gly Met Leu Val Lys Lys 705 710 715 720 Arg Asn Thr Pro Glu Phe Val Lys Lys Val Phe Asn Glu Val Lys Glu 725 730 735 Leu Met Ile Ser Ile Asn Ser Pro Asn Asp Val Lys Glu Ile Lys Arg 740 745 750

Lys Ile Val Asp Val Val Lys Gly Ser Tyr Glu Lys Leu Lys Asn Lys 755 760 765

Gly	Tyr 770	Asn	Leu	Asp	Glu	Leu 775	Ala	sequ Phe	ence Lys	lis Val	ting Met 780	ı.txt Leu	Ser	Lys	Pro		
Leu 785	Asp	Αla	Tyr	Lys	Lys 790	Asn	Thr	Pro	Gln	ніs 795	val	Lys	Ala	Ala	Leu 800		
Gln	Leu	Arg	Pro	Phe 805	Glу	val	Asn	val	Leu 810	Pro	Arg	Asp	Ile	11e 815	Tyr		
туг	val	Lys	Val 820	Arg	ser	Lys	Asp	Gly 825	val	Lys	Pro	val	Gln 830	Leu	Ala		
Lys	val	Thr 835	Glu	Ile	Asp	Ala	Glu 840	Lys	Tyr	Leu	Glu	Ala 845	Leu	Arg	Ser		
Thr	Phe 850		Gln	Ile	Leu	Arg 855	Ala	Phe	Gly	val	Ser 860	Trp	Asp	Glu	Ile		
Ala 865		Thr	Met	Ser	11e 870	Asp	Ser	Phe	Phe	Ser 875	Туr	Pro	Ser	Lys	Gly 880		
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<40	<400> 110 gggaaaggat cctcacttct tcttcccctt c												31				